FOUNDRY

FEBRUARY
1958

A PENTON PUBLICATION

Newness in a Foundry

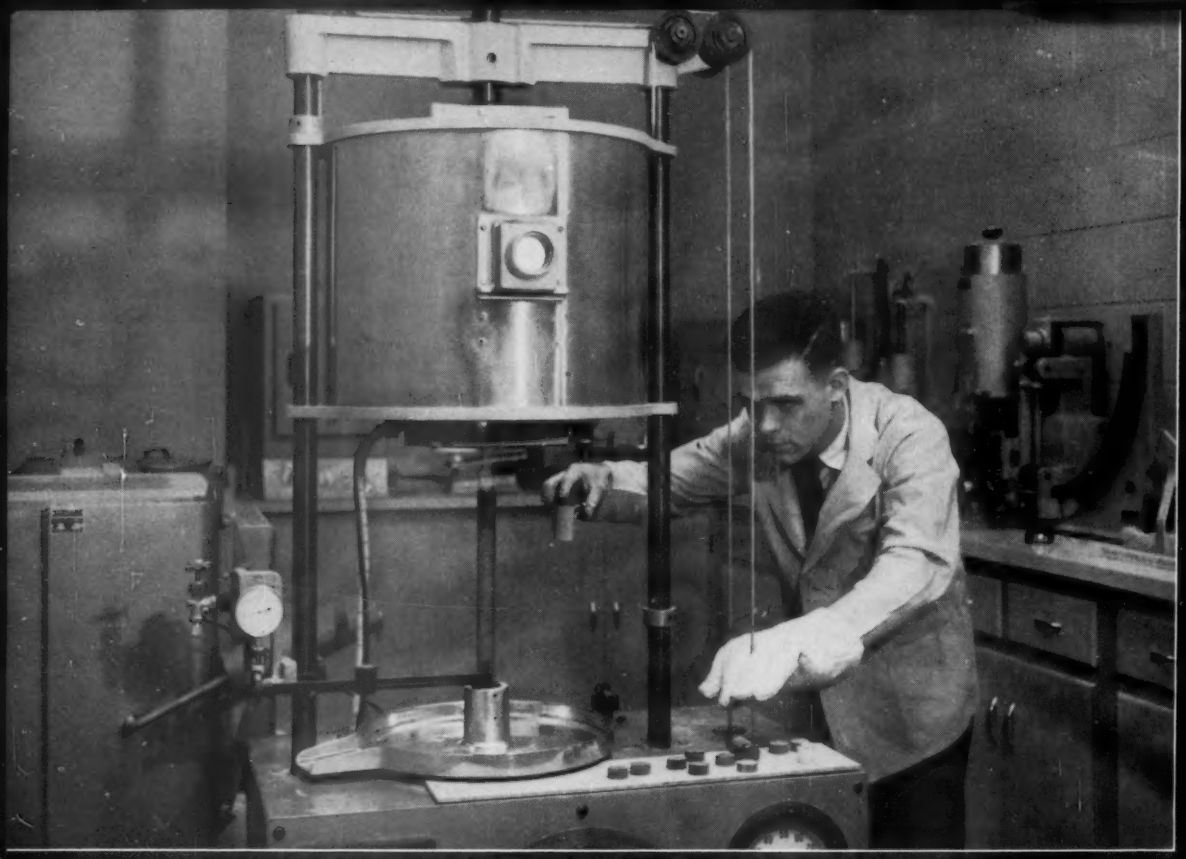
— Page 78

✔ **Sodium-Silicate Bonded Molds**

Use of waterglass as binder for shell molds is under development—Page 98

✔ **Large Aluminum Diecastings**

Size of individual castings, as well as total output, is growing—Page 102



At Magcobar's Des Plaines, Illinois, laboratory, A. H. Zrimsek uses modern methods for foundry sand research.

SCIENCE and SAND

. . . Recipe For Progress

In new laboratories at Des Plaines, Houston and Greybull Magcobar technicians are busy with silica, bentonite, water and a host of other ingredients, taking the guesswork out of sand formulas. Applying modern research methods, these scientists are *proving* the "hows" and "whys" of foundry sand practice.

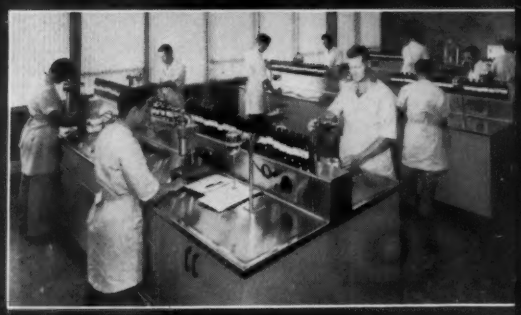
Magcobar invites the technical and research groups of the American Foundries to use Magcobar facilities for the solution of various industry-wide problems relating to sands.

Write Des Plaines for our latest foundry technical bulletins. Look to Magcobar, producers of YELLOWSTONE bentonite, for further revealing recipes for progress.

Magcobar
YELLOWSTONE
BENTONITE

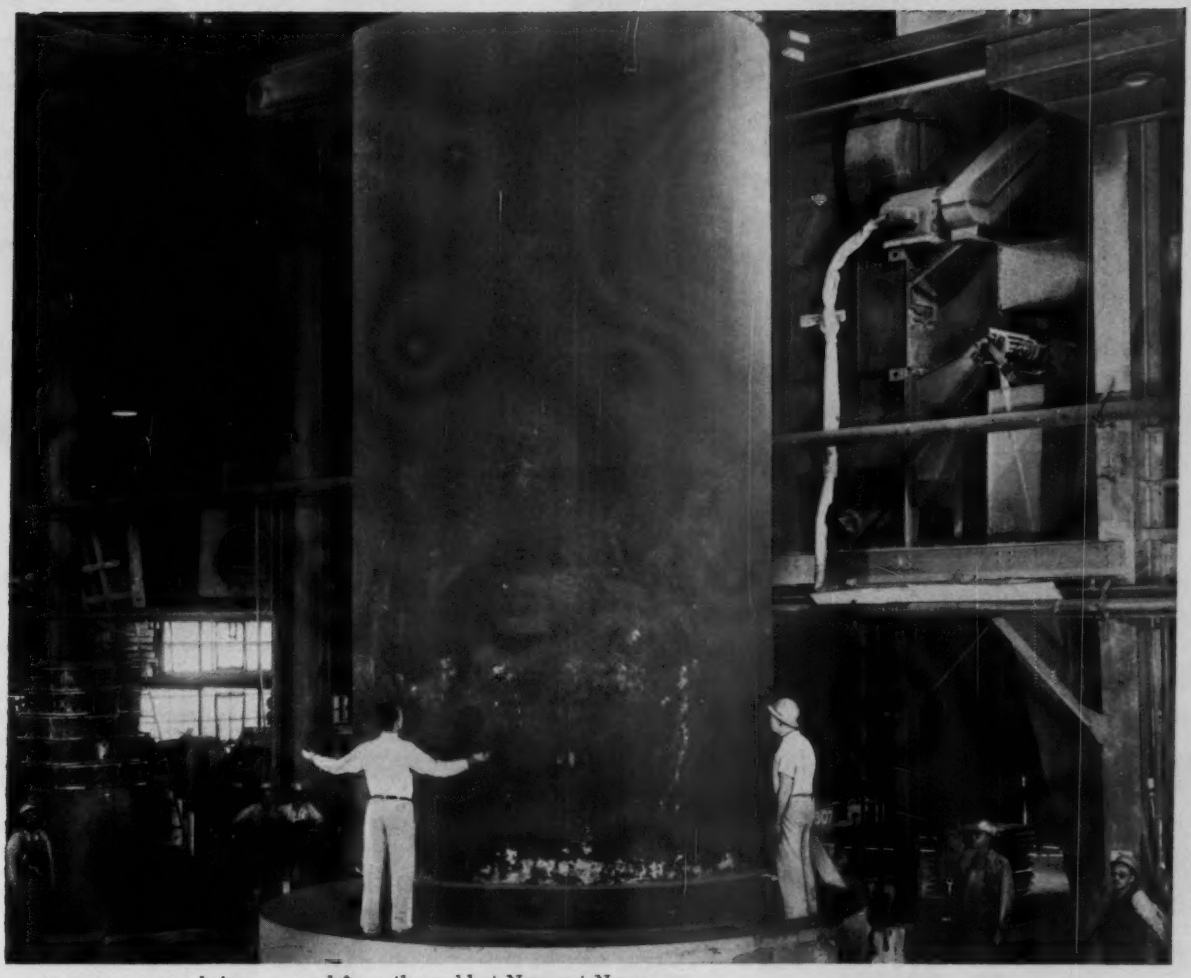
MAGNET COVE BARIUM CORPORATION

Des Plaines, Illinois, 576 Northwest Highway
Houston, Texas, P. O. Box 6504
Greybull, Wyoming



Magcobar technicians in the company's big research laboratories in Houston strive for constant improvement of Magcobar products.

This Magcobar plant at Greybull, Wyoming, where YELLOWSTONE is mined and processed, is the world's largest producer of bentonite, and includes a complete quality-control laboratory.



40-Ton Dryer Roll being removed from the mold at Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia.

How nickel cast iron helps take the risk out of large castings

Here's a Yankee dryer roll for example. It weighs 40 tons. Length: 262 inches. Diameter: 12 feet.

It's just too big to take a chance. The foundry can't afford a reject. Especially when a reliable metal can assure pressure tightness... ample strength... a smooth surface... and easy machining.

Nickel cast iron assures a sound casting through uniform metal structure

Nickel irons combine fine graphite in a uniform matrix. They promote strength and rigidity, and a surface free of imperfections.

Because of these properties Newport News specifies a nickel cast iron for these rolls. Even with today's high steam pressure this nickel cast iron dryer roll will stay pressure tight. It's definitely not a leaker. Its surface, thanks to nickel cast iron, is uniform and smooth.

The roll easily meets the strength levels required by the boiler code. The basic 1.34% nickel iron composition achieves 40,000 minimum tensile strength every time.

And Newport News needs nickel cast iron to get the high polish, mirror-like finish required on the roll. Uniform structure and the absence of carbides and defects afford a readily machined and polished roll.

You, too, can get this dependability in heavy iron castings — or in light ones that need high strength, pressure tightness and good machinability. Nickel cast irons are quality castings. And quality castings are good business ... for you, and for your customer.

For assistance on specific composition problems, contact Inco. Our engineers will gladly provide the metallurgical information you want.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK

NICKEL CAST IRONS

BEST FOR YOU BECAUSE THEY'RE BEST FOR YOUR CUSTOMERS

ADCOSIL

BEST FOR CO_2 CORES...

An exclusive feature in ADCOSIL is a color indicator that tells when to stop gassing a CO_2 core. The core mix is tinted a royal purple . . . then fades to a natural sand color when the core is cured throughout.

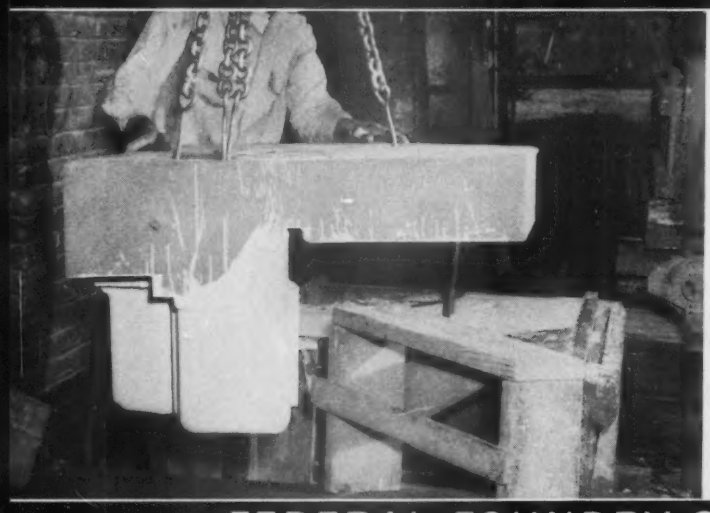
ADCOSIL helps determine where to place core vents and how many to use; helps rig new boxes and patterns; prevents under-gassing over-gassing; encourages cores designed for most efficient flow of gas; cuts time and costs; saves gas.

Flowability, workability, core hardness, and long bench life are inherent in ADCOSIL sand mixtures.

Several types are available:

For ferrous metals . . . . . ADCOSIL F
For non-ferrous metals . . . . . ADCOSIL NF
For super-collapsibility, all metals. ADCOSIL SC

ARCHER • DANIELS • MIDLAND COMPANY



LIN-O-SET

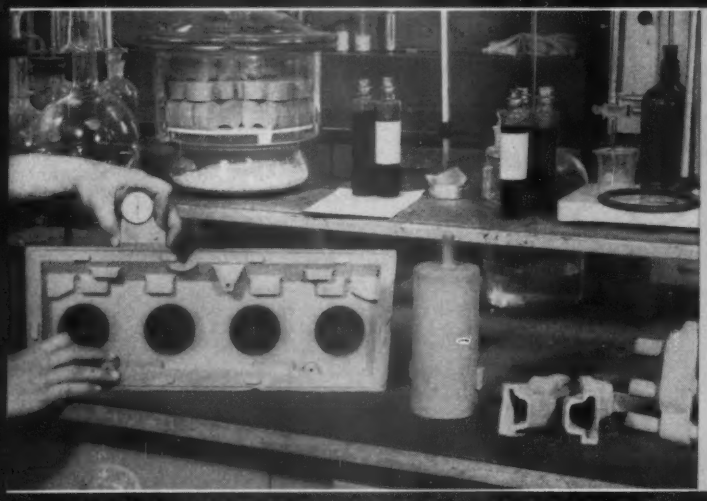
BEST FOR AIR SET CORES...

Original LIN-O-SET, introduced by ADM and praised by large jobbing foundries coast-to-coast, is scarcely a year old. Still, a newer and more phenomenal air-setting binder, LIN-O-SET II, is already available to foundries searching for maximum efficiency.

LIN-O-SET II works in room temperature at exceptional speed hardening the "core of the core" almost as fast as the exposed surfaces. An ADM "first", this development takes the guesswork out of drawing, since the curing of a LIN-O-SET II core combines internal polymerization with surface oxidation.

All this . . . plus the better-known LIN-O-SET features; minimum ramming; saving in cleaning time; thorough collapsibility; elimination of excessive rodding; control of set-up time; improved accuracy; elimination of objectionable odors and toxic gases.

FEDERAL FOUNDRY SUPPLY DIVISION



ADMIREZ

BEST FOR SHELL-MOLDS AND SHELL-CORES...

ADMIREZ CC-240, newly developed in ADM's Resin Research Laboratory, utilizes a cold coating process. It is a dry powdered product containing a cure catalyst which promotes rapid transformation of the resin from a low-melting-point, alcohol-soluble material to a hard, infusible solid under the influence of heated air.

Two basic improvements are offered by ADMIREZ CC-240 over earlier resins: elimination of sand-resin segregation; reduction of economically prohibitive high resin requirements. Advantages are: fast coating; quick breakdown during mulling; high flowability of coated sand; exceptionally fast cure time; excellent stripping from pattern; high tensile strength and lack of brittleness; low-shell breakage; lack of thermal plasticity.

2191 WEST 110TH STREET • CLEVELAND 2, OHIO

Now included in the Archer Quality Line...

SAN-BLO CORE BLOWER . . . WHIRLMIX SAND MIXERS
FEDERAL GREEN BOND BENTONITE . . . FEDERAL SAND STABILIZER
CROWN HILL SEA COAL . . . and a COMPLETE LINE of FOUNDRY FACINGS

Circle 554 on Page 51

Gentlemen, I am interested in trying: (Check One)

ADMIREZ CC-240 . ☐
LIN-O-SET II . . . . ☐
ADCOSIL F . . . . ☐
ADCOSIL NF . . . . ☐
ADCOSIL SC . . . . ☐

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Federal Foundry Supply Div.
2191 West 110th Street
Cleveland 2, Ohio

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Title_____

Company_____

Address_____

City_____ Zone_____ State_____

FOUNDRY

A PENTON PUBLICATION

February 1958

Volume 86—Number 2

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(For addresses of branch offices, see Page 237)

FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions.

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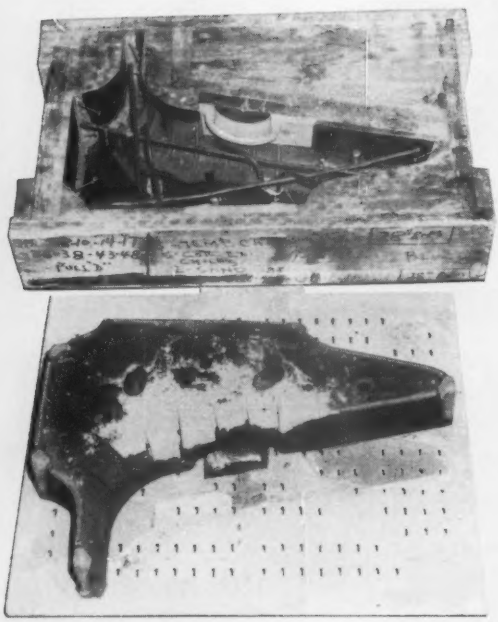
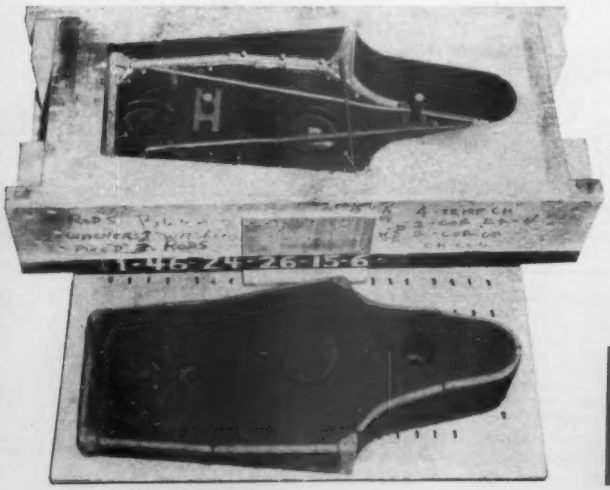
BLOWING CORES IN WOODEN BOXES IS PROFITABLE WITH..

SUBSTANTIAL SAVINGS, BETTER CORES, SMOOTHER PRODUCTION OPERATION WHEN SAN-BLO CORE BLOWERS GO TO WORK



Typical cores and boxes used by General Steel Castings Corp.



Metal core boxes, elaborate setups, automated lines, and long production runs are *not a prerequisite to low-cost, efficient core blowing.*

Using conventional hand-ram type wooden core boxes without elaborate rigging, many foundries now enjoy production increases double and triple the hand-ram rate after installing San-Blo Core Blowers.

WHY MODERN FOUNDRIES SPECIFY

San-Blo

SAFETY PULSATOR TYPE BLOW consists of 2, 3 or 4 short, quick, ramming blows—rather than the conventional, continuous blow. *Prevents* dangerous pressure build-up within the core box during the blowing cycle . . . *eliminates* the possibility of blowing core box apart.

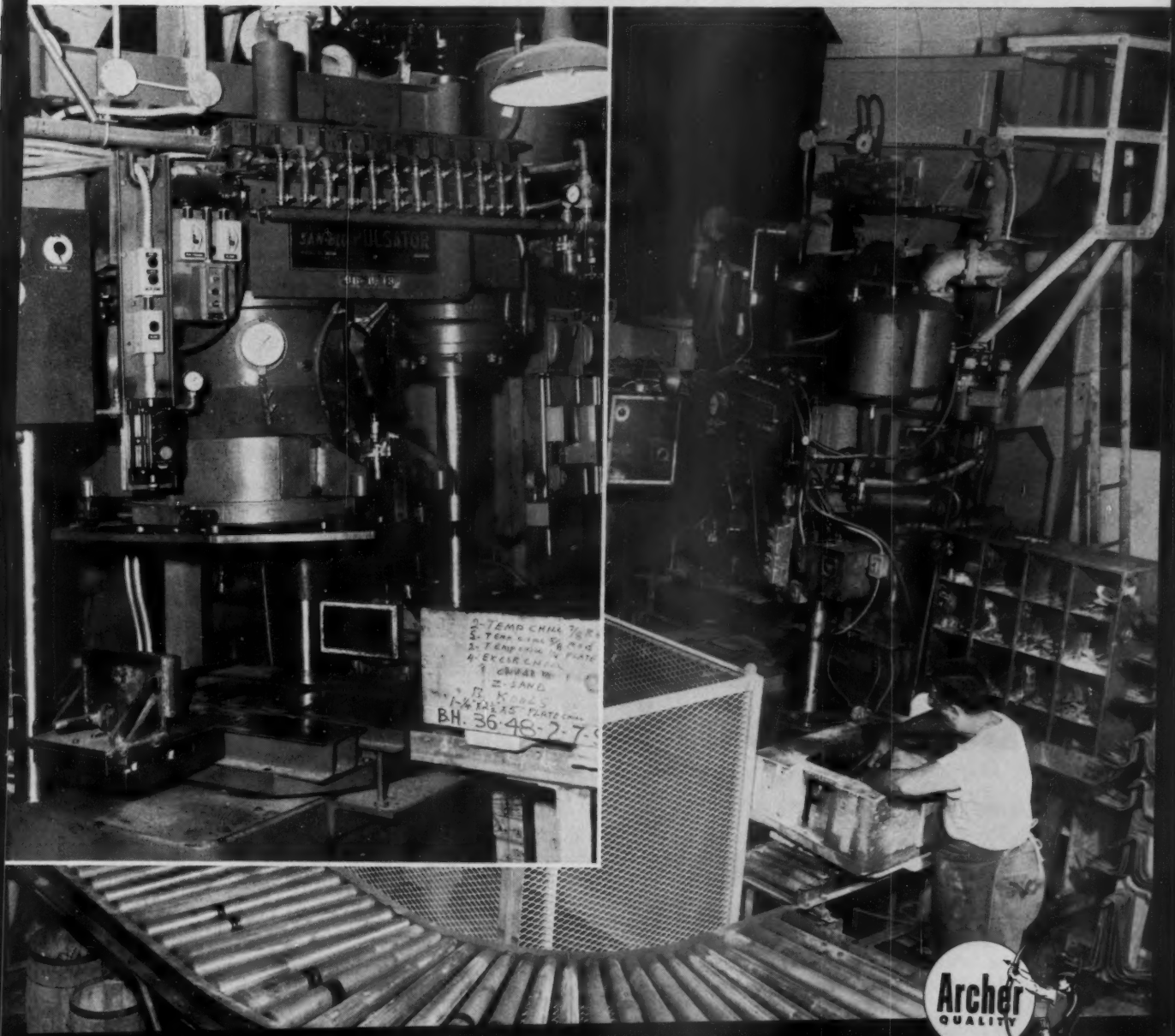
WEAR LOW PRESSURE PREFILL "riddles" a layer of fluffed sand on the bottom of the core box, *before* full ramming pressure is automatically cut-in. *Eliminates* the sand blasting or gouging of the bottom of core box, during the blowing cycle. Also holds chills and rods in place during the ramming blow.

RIGGING Federal's new UNIVERSAL, QUICK-CHANGE, BLOW AND VENT PLATE ASSEMBLY *is standard equipment* on all Pulsator model SAN-BLO machines. Blow plates for open-top boxes can now be made up in *less than 10 minutes time,* at a cost of but a *few dollars,* and can be changed on the machine in a *matter of seconds.* Further, since a majority of existing wooden core boxes are open-top, the universal vent plate generally eliminates the necessity of inserting vents in core boxes. As a result, the blowing of short-run cores becomes as economical as production runs.

San-Blo Department

San-Blo

MODEL 250-P-LPP SAN-BLO CORE BLOWER blows cores up to 250 lbs. This equipment is in service at the Commonwealth Plant, General Steel Castings Corp., Granite City, Illinois.



Archer QUALITY

Archer-Daniels-Midland company

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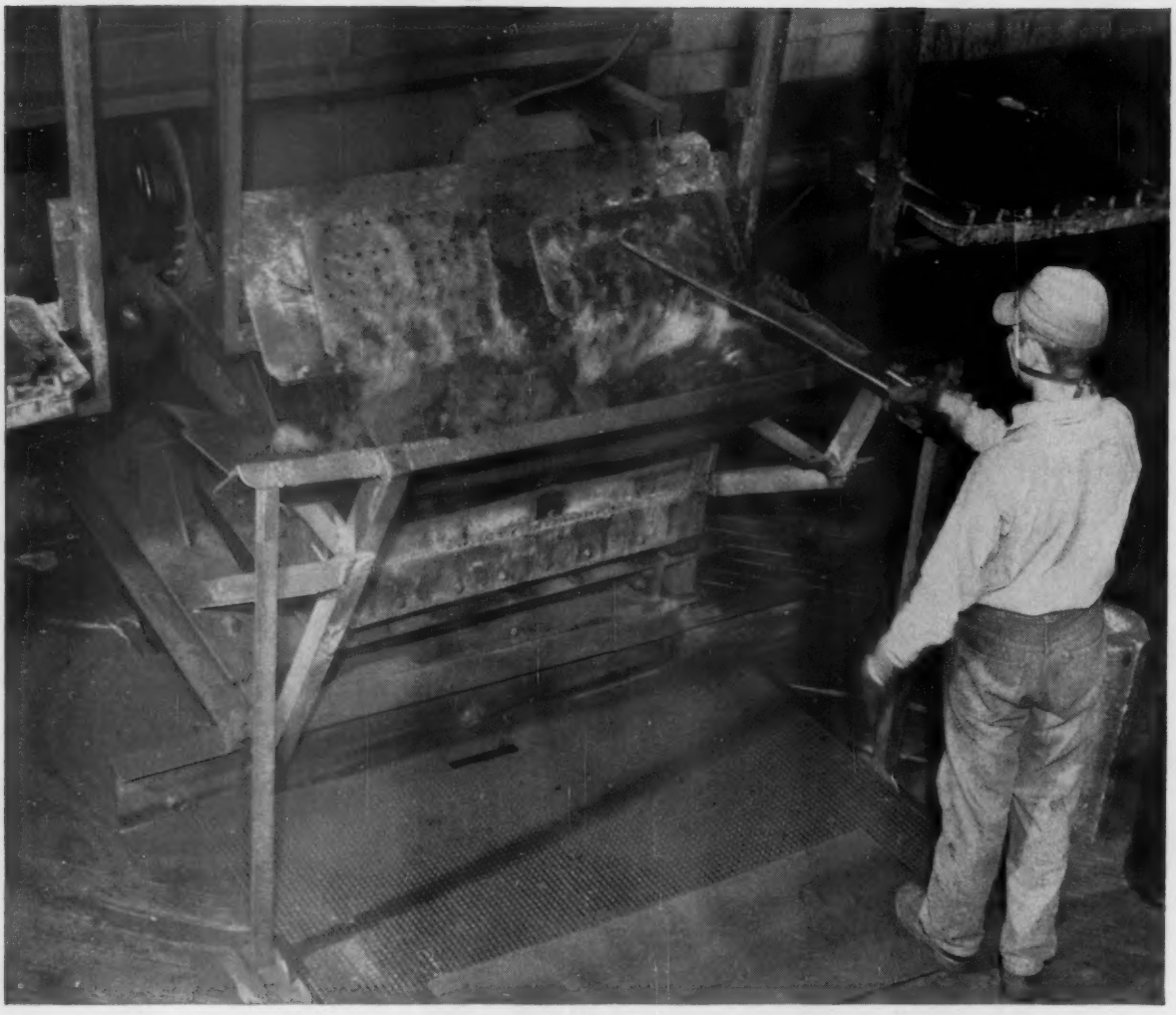
B.F.Goodrich report:



Searing hot sand burned out belt in 3 months

B. F. Goodrich improvements in rubber brought extra savings

Problem: At this foundry the sand shaken from those red-hot castings drops on an under-the-floor conveyor belt and is on its way to being used again. But the extremely hot sand baked the belt hard, made it crack and break. The belt needed constant repairs, had to be replaced every three months.

What was done: When a B.F.Goodrich salesman heard of the problem, he suggested a new belt, called Solarflex, specially designed by B. F. Goodrich engineers to handle hot materials. This belt is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden, crack and finally break down.

Savings: The B. F. Goodrich Solarflex belt has now given more than 1½ years of troublefree service—five times that of previous belts—and still shows no sign of wear. In fact, the plant superintendent says he expects at least two more years' use from the belt.

Where to buy: Your B. F. Goodrich distributor has the exact specifications on the belt that solved the problem in this foundry. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department M-264, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

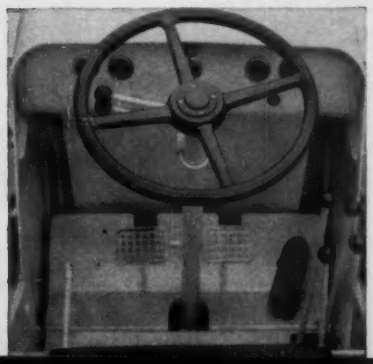
Circle 556 on Page 51

If you had to drive a car for 8 solid hours in traffic like this . . .

would you be satisfied with an old fashioned gear shift?

Even an antique car enthusiast will have to admit that a manual gearshift is a tiresome business when you're caught in a traffic jam—when you have the constant clutching, and declutching and inching along in bumper-to-bumper traffic.

Did you ever recognize the similarity between a traffic jam and a typical bulk-handling job? In both cases, the runs are relatively short, constantly Stop and Go (and in bulk handling, constantly Forward and Backward). The automobile manufacturers long ago took this burden off the driver by giving him various types of "clutchless" transmissions. Now Clark has done the same thing for the industrial Tractor Shovel operator: Clark's exclusive Power-Shift transmission on the 16 cu. ft. MICHIGAN Model 12B.



No clutch pedal, no engine clutch

The small photo at left shows the operator's compartment of the MICHIGAN Model 12B. There's a double brake pedal—operate it with either foot. There's no clutch pedal, no engine clutch, no gear clash when shifting. This heavy-duty Clark transmission is as fast and as easy to operate as a modern car—the driver merely selects High-Low-Forward or Reverse and lets the Power-Shift transmission do the work. He can make any shift while moving in either direction.

Improves operator efficiency

Power-shifting drastically reduces operator fatigue. The MICHIGAN operator doesn't have to ride a clutch all day. He can work smoothly and easily through peak periods throughout the day and still be close to top efficiency when bulk-handling runs overtime. New operators can learn to run the MICHIGAN Model 12B in a few hours. And when several operators take turns on the MICHIGAN, the machine doesn't suffer—the hydraulic-operated Power-Shift transmission provides built-in protection against "clutch riders" and "cowboys."

See for yourself

Without any obligation, you can put the MICHIGAN Model 12B to work on any job in your own plant. We'll bet the MICHIGAN will outproduce any loaders in its size range, bar none. You be the judge. Clip the signature below to your letterhead and mail to us—we'll make the arrangements for an on-the-job demonstration.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Rd.
Benton Harbor 4,
Michigan

CLARK® EQUIPMENT

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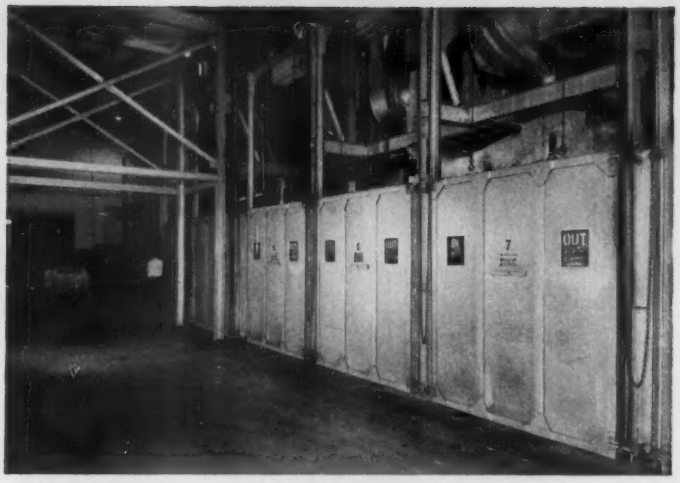
How much money can you really save using



Coleman Transrack Ovens

COLEMAN OVENS

in your core department?

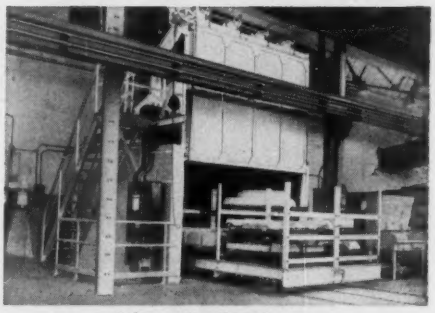
Performance records in all classes of foundries prove that Coleman Ovens reduce overall core department costs by as much as 50%! In fact, many Coleman Ovens pay for themselves out of savings in less than a year!

Coleman Core and Mold Ovens, through modern engineering and more than half a century of specialized foundry experience, have an outstanding record for reducing scrap losses, fuel, material and labor costs. The uniform heating, accurate controls and work handling methods found exclusively in Coleman Ovens are responsible for immediate improvement in cores, molds and casting quality.

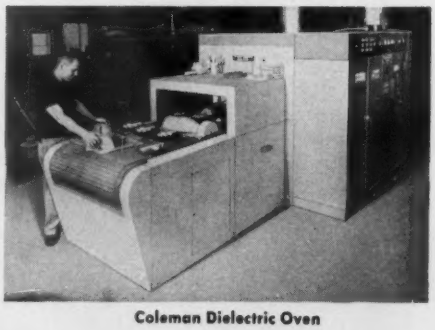
Since production savings are so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens immediately. Let our experienced engineers show you how modern Coleman Ovens can pay dividends in your foundry.

As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best oven for your purpose.

Coleman Tower® Oven



Coleman Car-Type Oven



Coleman Dielectric Oven

WRITE FOR BULLETIN 54

A COMPLETE RANGE OF TYPES AND SIZES:

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens • Car-Type Core Ovens • Car-Type Mold Ovens • Transrack Ovens • Rolling Drawer Ovens • Portable Core Ovens • Portable Mold Dryers • Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

MEMBER FEMA

This beat his best cut-off wheel by 50%

John Martin, abrasive specialist for Mau-Sherwood Supply Co., knew Bay State's BZ2 was already one jump ahead of competition. Yet, when the new BZ2AA came out, he persuaded Peter Kriegkoff, cleaning room foreman at Cleveland Brass Mfg. Co., to test it thoroughly . . . cutting brass valve bodies under standard production conditions.

Result: 33% more total cuts plus faster cutting which added up to 50% greater efficiency.

Explanation: Bay State's new bond closely matches the wearing and fracturing behavior of the abrasive grain . . . gets more cuts per grain.

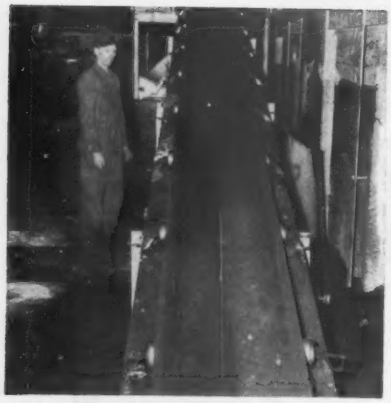
The Bay State man in your area can find practical, profitable solutions to *your* grinding problems. Why not look him up—or write us? *Better grinding at lower cost—that is his business.*

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Circle 559 on Page 51



Previous belts lasted 9 months

. . . but this Imperial Insulated Sahara Belt has already been in service **22** *months!*

No wonder the foundry superintendent for Fairbanks, Morse Co. is a booster for Imperial* Insulated Sahara* Belting. For only a small difference in initial cost, he is getting three times the length of service obtained from belts previously used.

This conveyor is used on a high production schedule for handling hot shakeout sand. Temperatures frequently exceed 400° F. Imperial Insulated Sahara withstands this gruelling service because it is made from tight-woven heavy-duty hard silver duck, and protected against the destructive heat by asbestos insulation and a special impregnating compound.

Let Imperial's experienced engineers help you solve your hot belt problems. Call today, or mail coupon below for new Belting Catalog and Engineering Handbook.

**Reg. Trademark of Imperial Belting Co.*

Imperial
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1755 S. Kilbourn Ave., Chicago 23, Ill.

You expect MORE from Imperial . . . and you get MORE!

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Circle 560 on Page 51

With the Editors

It Can Be Cast: Ford Motor Co., in announcing the production of the 25,000,000th V-8 engine recently, distributed a news release telling of the problems encountered in casting the first V-8 blocks. As pointed out, many in the foundry industry thought the V-8 block could not be mass-produced successfully, and the rumors of bugs in the early days of that casting operation were as numerous as the stories about the "Tin Lizzie."

Henry Ford is reported to have made the statement at that time that "anything that can be drawn up can be cast." It might be well if more foundries today would sell that idea to the metalworking industry.

A part of the release is as follows:

It was on Dec. 7, 1931, when Mr. Ford abruptly halted production of the four-cylinder model and announced he would begin mass production of a car to be powered by a V-8 engine. When he said he would do this by casting the engine block in one piece, the experts refused to believe what they heard. There was no way possible, they said, to make a sand mold that would successfully cast an engine block with two banks of four cylinders set at right angles to each other, plus 16 valve sections and some 30 other openings, all in one massive chunk. To a man, they advised against even attempting it. If Mr. Ford heard the clamor, he shunned it and went on to become the first to make rapid monoblock casting possible.

As an engine design the V-8 was far from new. The De Dion Bouton Co. in France had been making them since 1909. In 1931, any buyer with $4000 or more in his pocket could have his choice of 13 different American automobiles with V-8 engines. They were the most powerful cars on the road. They were also the most expensive. The cylinders were cast sometimes singly, sometimes in pairs, sometimes in groups of four, then bolted together in V-shaped alignment. The result was a fine, hand-made engine, but the process was slow and production costs were enormous.

If Henry Ford ever once thought that a one-block casting of his V-8 engine was contrary to all reason, he never admitted it, even to himself.

"Anything that can be drawn up," he said, "can be cast."

In the old Edison laboratory at Greenfield Village, which the engineers called "Fort Myers," Mr. Ford and others drew sketches. They chalked them on a big blackboard, took pictures of them, changed the design and took more pictures, then swabbed the board clean and started over.

"Funny thing about that engine," one of the engineers said years later about the V-8. "The whole thing was designed out of Henry Ford's vest pocket. Just sketches that he made . . ."

In the foundry, life was taking on all the aspects of a nightmare. Hot metal turned the sand to slag in the molds. Cores shifted out of position and sometimes burned up when the hot metal hit. Sand holes erupted through the walls of the castings. Blocks cracked and fell apart.

The new car with the V-8 engine had been promised to the public on April 1, 1932. As 1931 drew to a close, engineers and foundrymen were working around the clock, some of them virtually living in the foundry, in their frantic race against time.

It was March 9, with three weeks to go till deadline, when the first good V-8 block came out of the foundry. Casting problems were overcome finally by the use of phenolic resin to bind the sand. Cores were wired and placed by machine rather than by hand.

The first good V-8 that came out of the Rouge foundry that March 9, 1932, may still be seen in the Henry Ford Museum in Greenfield Village—a solid monument to the stubborn persistence of a man who insisted simply:

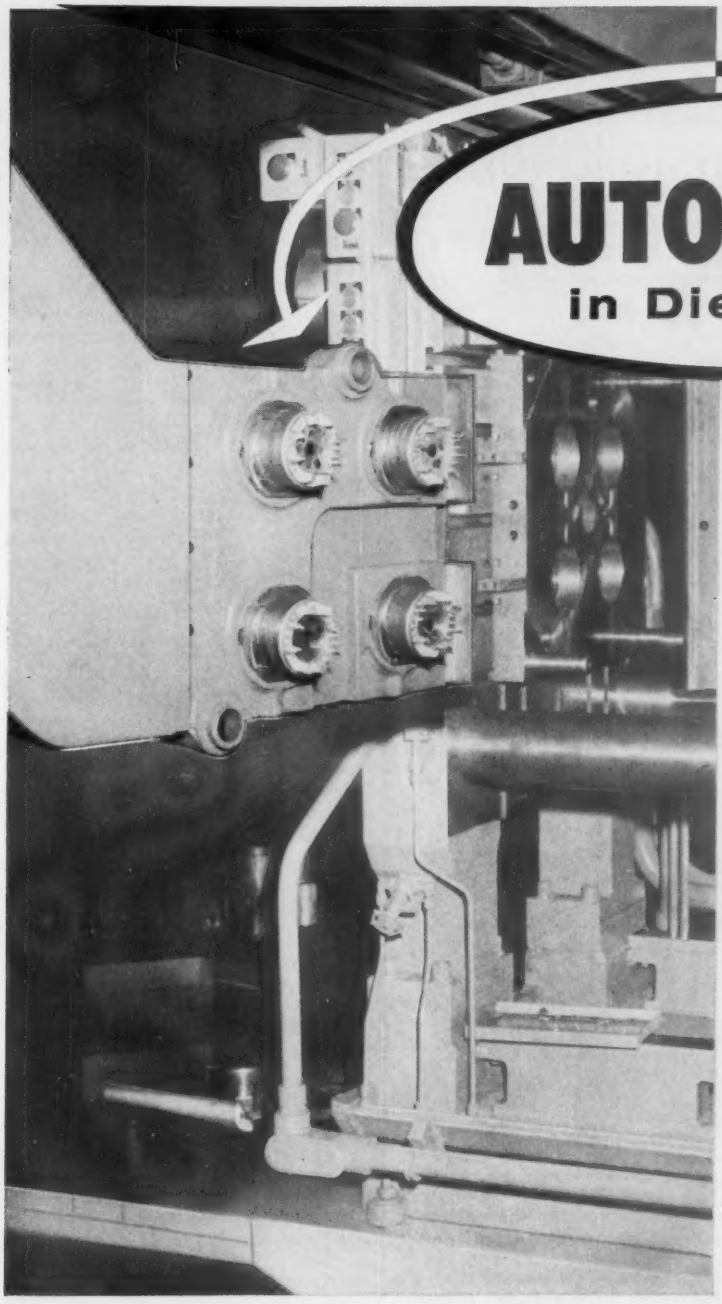
"Anything that can be drawn up can be cast."

—o—

In Costume: The many Christmas and New Year cards received at the FOUNDRY office were appreciated greatly.

One of the most interesting came from Mr. and Mrs. James S. Vanick

and carried the accompanying illustration. Jim, of the International Nickel Co., and Mrs. Vanick were in Europe last summer attending the International Foundry Congress at Stockholm. Included in a tour of the Continent was a visit to Volendam,



AUTOMATION
in Die Casting

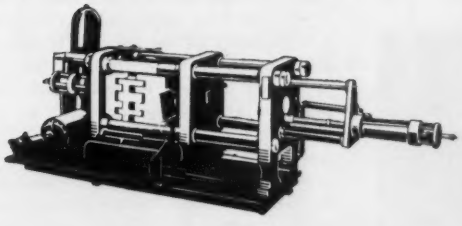
NEW! MULTIPLE CAVITY LOADER-UNLOADER

- Loads Laminations
- Die Casts
- Trims
- Unloads 4 rotors automatically

Another illustration of the pace-setting advances that are coming from Cast-Master! A major motor manufacturer gave Cast-Master the job of stepping up production and reducing labor on die-casting laminated rotors. Cast-Master solved the problem with this new, automatic loader-unloader. "Hydraulic muscles" load, trim, press out dummy shafts, unload automatically — cut costs while maintaining uniform quality. **One more example of the skill and know-how at your disposal when you turn your problems over to Cast-Master.**

FULLY DETAILED BROCHURE

Just off the press. Illustrated brochure giving complete details on this new CAST-MASTER loader-unloader. Phone, write or wire, and we'll get a copy to you at once.



Eastern Rep. Milton Harmon, 18 Rock Rd., Milford, Connecticut
Midwest Rep. C. W. Stone Co., Minneapolis, Minnesota
Western Rep. Sydney J. Wills, 2120 Strand, Hermosa Beach, Calif.

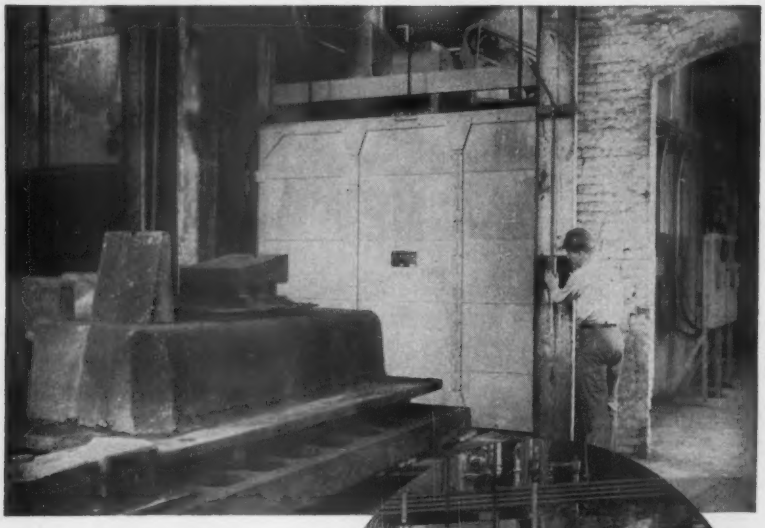
CAST-MASTER *Inc.*

23901 AURORA RD.
BEDFORD, OHIO

Circle 561 on Page 51

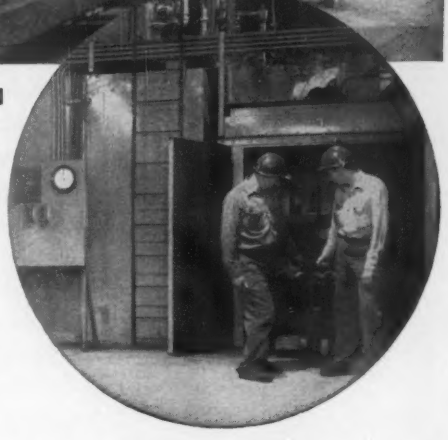
here's another **carl mayer** installation...

Cutting Costs for its Owner



CAR TYPE CORE AND MOLD OVEN

Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.



RACK TYPE CORE OVEN

Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Holland, an historically preserved fishing and ancient customs reservation on the Dutch coast and in the Zuider Zee dyke area. While there, the Vanicks dressed in Dutch costume and posed for a picture. I think they look authentic enough that they could pass for natives.

A second card with a photograph made at Volendam was received a short time later from Mr. and Mrs. James H. Enochs of Dallas, Tex. Jim was my roommate in college and a former district manager of Harnischfeger Corp. He and Mrs. Enochs were in Europe for a Rotary International convention.

—o—

Toledo Visit: While it was a bit early in the month, the December meeting of the Toledo Chapter of AFS had a Christmas atmosphere, with a tree and all the trimmings. After the meeting, the chapter photographer lined up several of us before the tree, and the accompanying

illustration was the result. Reading from left to right are: M. J. Gruhler, Unitcast Corp., Toledo, and chairman of the chapter; the editor of FOUNDRY from Cleveland, speaker at the chapter that evening; Richard Bossert, Maumee Malleable Casting Co., and vice chairman of the chapter; Harry W. Dietert, Harry W. Dietert Co., Detroit, president of AFS; and Gerald Rusk, Freeman Supply Co., Toledo, a director of AFS.

—o—

Washington Malady: A paragraph from the Dec. 26 issue of our sister publication, *Machine Design*, describes a Washington malady which could well have tragic consequences unless Congress provides corrective measures:

Competitive and military advantages of secrecy are at best short-lived. Secrecy may not even create a false sense of security. Yet we are still closely guarding information that is known to our enemies and competitors and is secret only to our own people. Now it seems that if we hadn't been so preoccupied with preserving our own secrets, and had bothered to study the Russians' own publications, we might have been tipped off to some of their recent "surprising" accomplishments.

F.G.S.

MECHANICALLY LOADED, THIS CHARGING BUCKET . . .
IS LIFTED FROM TRANSFER CAR TO CHARGING FLOOR . . .
87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS
WHITING 5 TON
. . . WHERE GANTRY CHARGING CRANE MOVES IT INTO CUPOLA. THIS MECHANIZED FOUNDRY MELTS 225 TONS OF IRON PER 16-HOUR DAY!

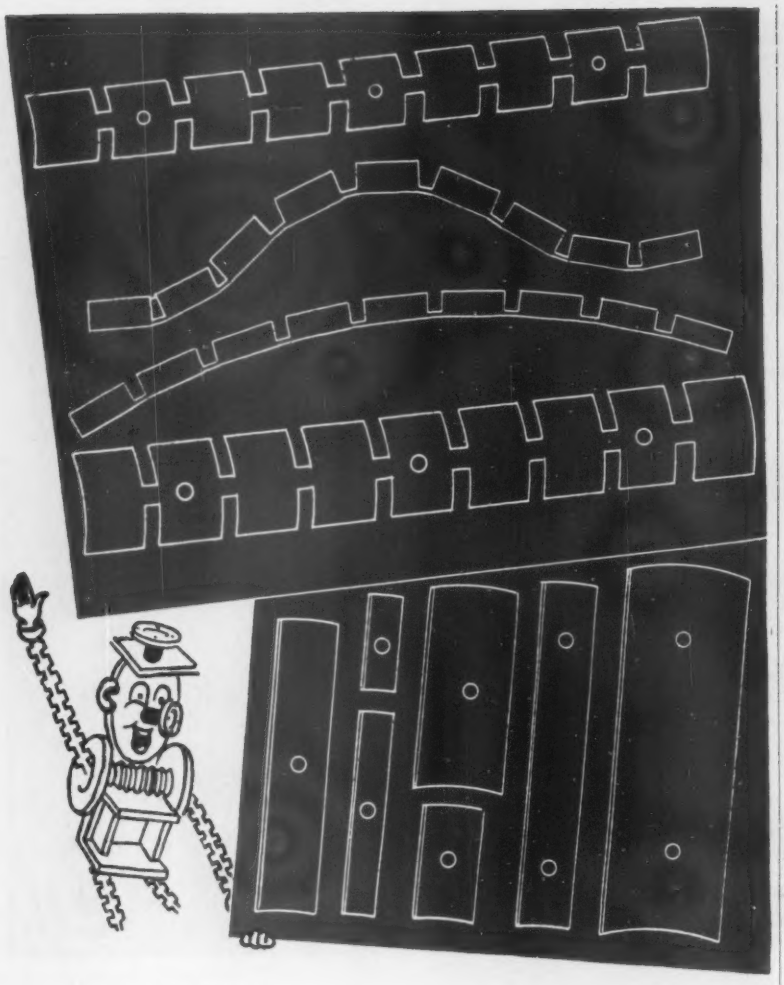
At American Standard... Charging time cut one-third!

New mechanization at American Radiator and Standard Sanitary Corporation, Baltimore, has resulted in an immediate ⅓ reduction in charging time! Here, in a refurbished foundry, Machine Age speed is accompanied by economy and reliability. A Whiting Yard Crane now unloads scrap metal . . . and Whiting Cupolas, Ladles, Weigh Hoppers and a Gantry Charging Crane team up to produce more, and produce it faster. Practical allocation of manpower helps American-Standard pare its over-all production costs even more!

Learn about the advantages gained when you use foundry equipment designed for your needs. Write for the Booklet, "Whiting Foundry Equipment." Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.

WHITING FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT



Milwaukee

PATENTED ADJUSTABLE RADIUS CHILLS

STANDARD RADIUS CHILLS

SPECIAL CHILLS

Eliminates Small Surface Cracks in Fillets

Prevents Molten Steel from Cutting into Sand

Easily Bent to Fit Along Curved Edges

Saves Cleaning and Welding Costs

Available in Fixed Radii from 1/4" to 1 1/2"

Milwaukee Chaplet & Mfg. Co.

1025 SOUTH 40th STREET • MILWAUKEE 46, WISCONSIN

Calendar of MEETINGS

Feb. 6—American Coke & Coal Chemicals Institute, western regional meeting, Drake Hotel, Chicago.

Feb. 6-7—Malleable Founders' Society, technical and operating conference, Wade Park Manor, Cleveland.

Feb. 7-8—Non-Ferrous Founders' Society, West Coast management and operating conference, Ambassador Hotel, Los Angeles.

Feb. 9-14—American Society for Testing Materials, committee week, Statler Hotel, St. Louis.

Feb. 13-14—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 16-20—American Institute of Mining, Metallurgical & Petroleum Engineers, annual meeting, Hotels Statler and Sheraton-McAlpin, New York.

Feb. 18-20—Investment Casting Institute, annual spring meeting, New York.

Feb. 20-21—Southeastern Regional Foundry Conference, Chattanooga, Tenn.

Mar. 12-13—Foundry Educational Foundation, college-industry conference, Hotel Statler, Cleveland.

Mar. 17-18 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

Apr. 14-17—Design Engineering Show, International Amphitheater, Chicago.

Apr. 21-23—Association of Iron and Steel Engineers, spring conference, Dinkler-Tutwiler Hotel, Birmingham, Ala.

May 1-8 — American Society of Tool Engineers, annual meeting and convention, Convention Center, Philadelphia.

May 8-10—American Material Handling Society, western regional material handling show, Great Western Exhibit Center, Los Angeles.

May 9-10—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago.

May 12-16—American Society for Metals, 1st southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

May 19-23—American Foundrymen's Society, 62nd annual convention and exhibition, Public Auditorium, Cleveland.

May 19-20—Non-Ferrous Founders' Society, annual meeting, Carter Hotel, Cleveland.

May 21-22—American Iron & Steel Institute, annual meeting, Waldorf-Astoria Hotel, New York.

June 9-10—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 9-12—National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13—International Automation Exposition and Congress, Coliseum, New York City.

June 12-13 — American Foundrymen's Society, annual chapter officers conference, Hotel Sherman, Chicago.

June 19-21—American Foundrymen's Society, foundry instructors seminar, Case Institute of Technology, Cleveland.

June 22-27—American Society for Testing Materials, annual meeting, Statler and Sheraton-Plaza Hotels, Boston, Mass.

Sept. 10-11—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 15-19—Instrument Society of America, annual instrument - automation conference and exhibit, Convention Hall, Philadelphia.

Sept. 22-23—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Oct. 8-10—Gray Iron Founders' Society, annual meeting, Sheraton Park Hotel, Washington.

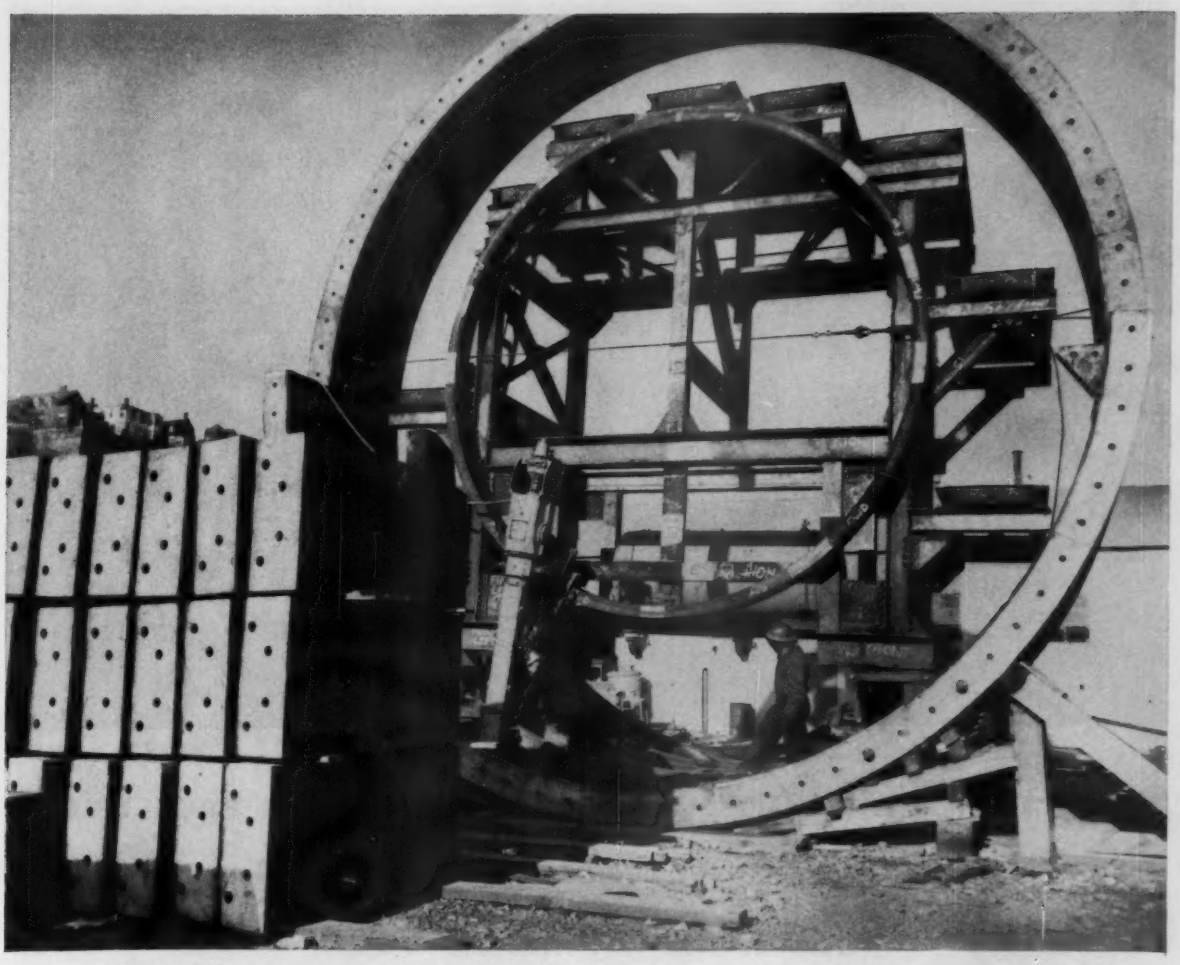
Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-21—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 27-31—American Society for Metals, national metals exposition and congress, Public Auditorium, Cleveland.

Nov. 10-12—Steel Founders' Society of America, technical and operating conference, Carter Hotel, Cleveland.

Circle 564 on Page 51



CASTINGS TO KEEP TRAFFIC MOVING SMOOTHLY—Giant castings, such as these used in highway tunnels, are another example of how the foundry industry contributes to progress.

TRULINE® BINDER ENDS FOUNDRY TRAFFIC JAMS

Foundries can't afford traffic jams. That's where Truline comes in—helping to keep castings moving on schedule and preventing oven bottlenecks.

In the core room, in the oven, in the cleaning room, Truline Binder avoids delays every step of the way. For example, Truline's quick bake often makes it possible for one oven to do the work of two. Cores bonded with Truline collapse readily; are easily removed by hydroblast or knockout.

To learn more about how Truline can help keep your foundry on schedule, write for full information.

HERCULES

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware

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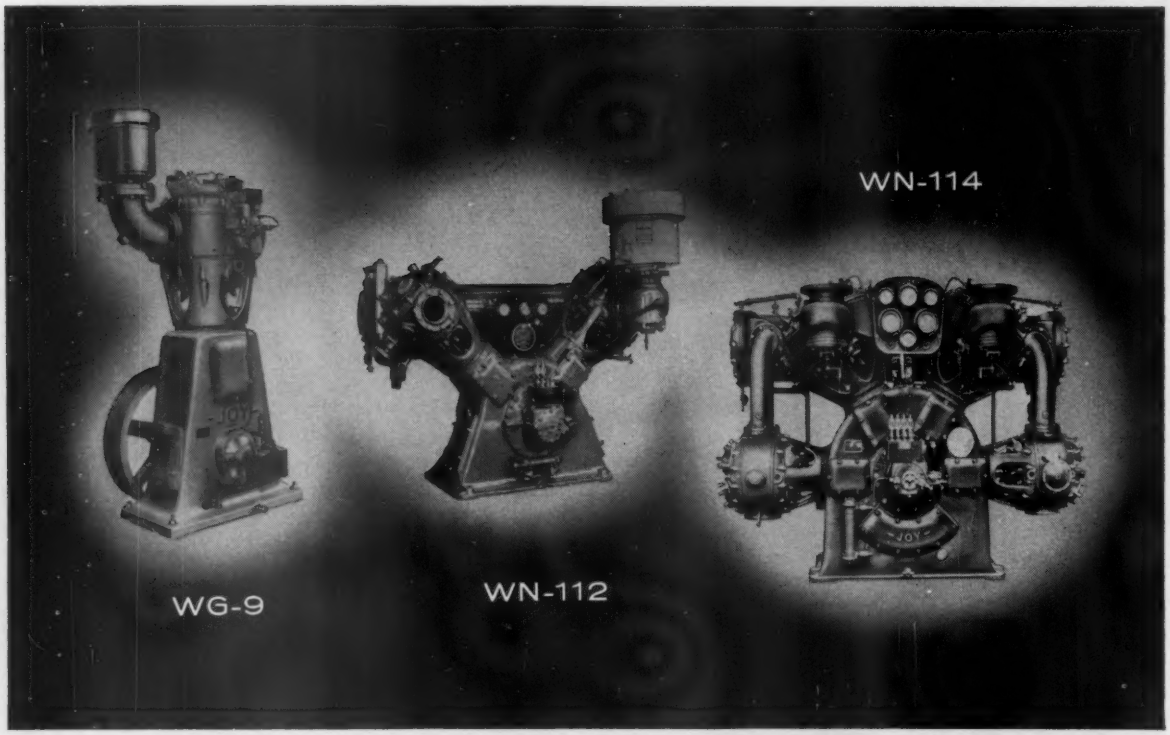

NEED TO *Expand* YOUR COMPRESSED AIR FACILITIES?

WRITE FOR THESE FREE BULLETINS ON JOY COMPRESSORS

JOY WG-9 • 15 to 75 Horsepower • 95.6 to 939 CFM

Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

JOY WN-114 • 175 to 600 Horsepower • 1186 to 3896 CFM

Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

EQUIPMENT FOR INDUSTRIAL PLANTS...FOR ALL INDUSTRY

WRITE FOR BULLETIN SET 156-13

AIR & GAS COMPRESSORS

FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

WSW 16471-156

Circle 566 on Page 51

Thiem sand gaskets

(cope and drag sealer)

go farther cost less

- Reduces man hours — eliminates dough rolling and gun filling.
- Prevents "fins" and metal "run outs."
- Uniform dimension — a perfect seal every time.
- Completely disintegrates.
- Long shelf life — will not dry out.
- Available in 32-inch lengths in 3/16, 1/4, 3/8, 1/2, 5/8 and 3/4-inch diameters.
- Conveniently packaged for easy handling.

Contact your Thiem Man, or write direct!

Thiem

PRODUCTS INCORPORATED
Milwaukee 19, Wisconsin
Manufacturers of foundry products exclusively

THIEM DISTRIBUTORS

Brumley-Donaldson Company, Los Angeles & Oakland, Calif.
Combined Supply & Equip. Co., Inc. Buffalo, New York
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Walter A. Zeis, Webster Groves, Missouri
Don Barnes Foundry Supplies & Equip. Hamilton, Ontario, Canada
Western Foundry Sand Co. Seattle, Washington
Kramer Industrial Supply, Inc. Denver, Colorado
C. Eugene Silver, Houston, Texas
Everitt H. Lueders Bala Cynwyd, Penna.
Pearson & Smith Spokane, Washington

"Why have **Hundreds of Foundries** called on **Knight Engineers** for assistance?"

"Because whatever castings you produce, whatever your foundry problem, **Knight Engineering experience** can help lower costs, improve quality control, and increase unit production."

Knight services successfully used by hundreds of foundries of every type include:

Foundry Engineering	**Flexible Budgeting**
Architectural Engineering	**Production Control**
Construction Management	**Foundry Mechanization**
Foundry Organization	**Foundry Modernization**
Foundry Management	**Foundry Methods**
Industrial Engineering	**Materials Handling**
Wage Incentives	**Automation**
Cost Control	**Survey of Facilities**
Standard Costs	**Personnel Training**

Marketing

For further information on the broad background and experience of the Knight organization in the foundry field write for Bulletin 101.

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

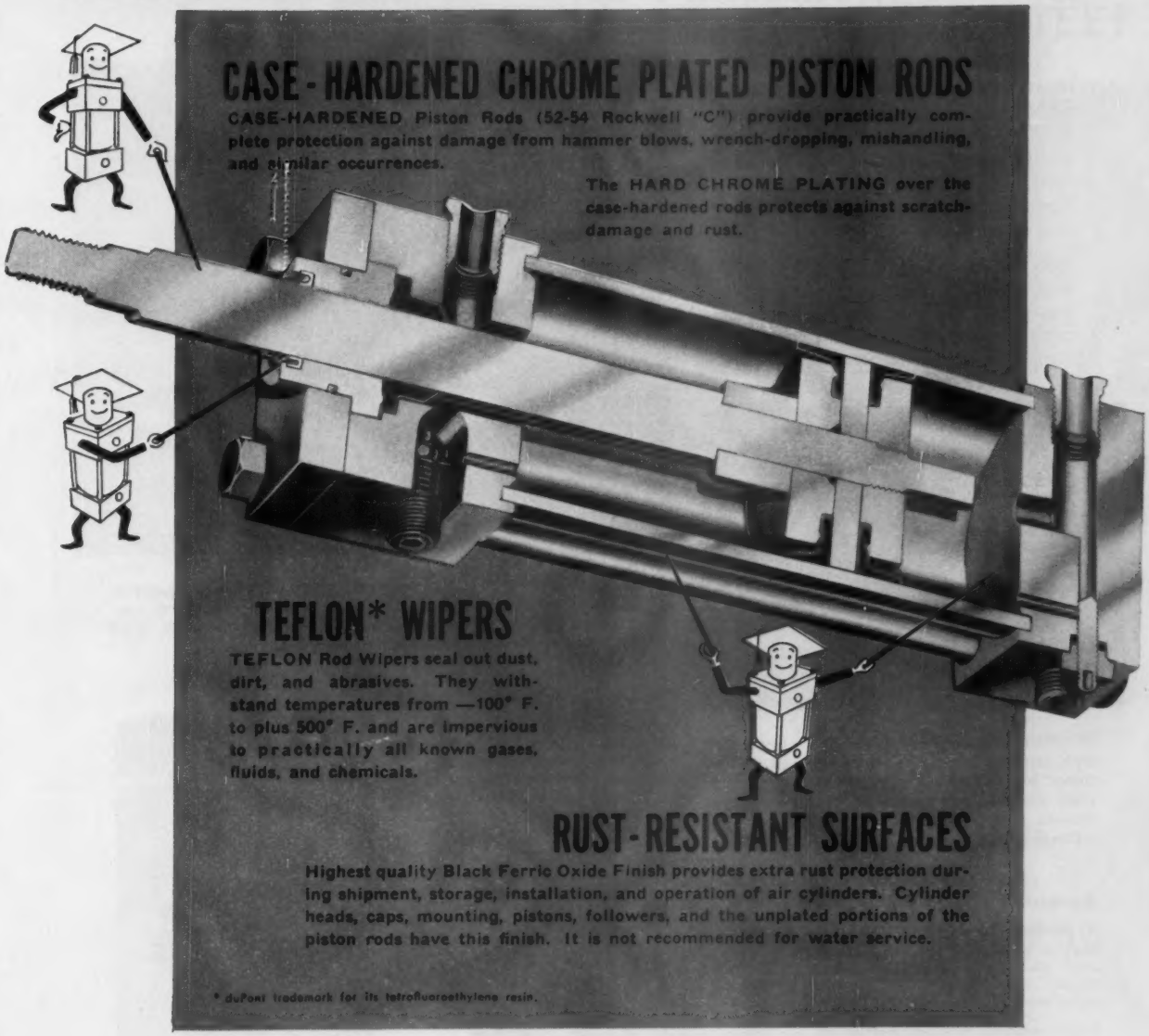
Management, Industrial and Architectural Engineers

Member of the Association of Consulting Management Engineers, Inc.
549 W. Randolph St., Chicago 6, Ill.
917 Fifteenth St., N. W., Washington, D. C.
New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16
Knight Engineering Establishment (Vaduz), Zurich Branch, Bahnhofstrasse 17, Zurich, Switzerland

At No Extra Cost . . .

AIR CYLINDERS

with EXTRA QUALITY Features!



CASE-HARDENED CHROME PLATED PISTON RODS

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences.

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust.

TEFLON* WIPERS

TEFLON Rod Wipers seal out dust, dirt, and abrasives. They withstand temperatures from —100° F. to plus 500° F. and are impervious to practically all known gases, fluids, and chemicals.

RUST-RESISTANT SURFACES

Highest quality Black Ferric Oxide Finish provides extra rust protection during shipment, storage, installation, and operation of air cylinders. Cylinder heads, caps, mounting, pistons, followers, and the unplated portions of the piston rods have this finish. It is not recommended for water service.

* duPont trademark for its tetrafluoroethylene resin.

Other Standard Miller Quality Features include: bar stock steel heads, caps, and mountings; rust-resistant brass barrels; self-regulating, wear-compensating piston rod seals that never require adjustment; space-saving square design; and other features as shown in Bulletin A-105 sent free on request.

Sales and Service from Coast to Coast . . .

Miller Air Cylinders are available in 1½" through 20" bores for 250 psi operation. Select from 19 standard mountings, strokes up to 22 feet, single and double rod end, cushioned and non-cushioned, and over-size rod cylinders. Large selection for immediate delivery.

Circle 569 on Page 51

FLUID POWER DIVISION

2034 N. Hawthorne Ave., Melrose Park, Ill.

Your Sand System
is as Good as Its Weakest Part

. . . That's why successful foundries invest in NEWAYGO ENGINEERED SAND SYSTEMS and COMPONENTS. Newaygo equipment is "foundry designed" to give continuous performance day after day, month after month, under toughest foundry production conditions.

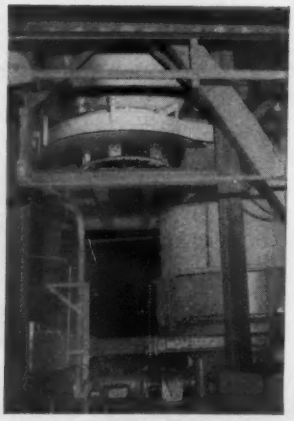
All NEWAYGO ENGINEERED EQUIPMENT, whether it is a complete system or a component part stresses rugged construction — minimum handling and maximum production.

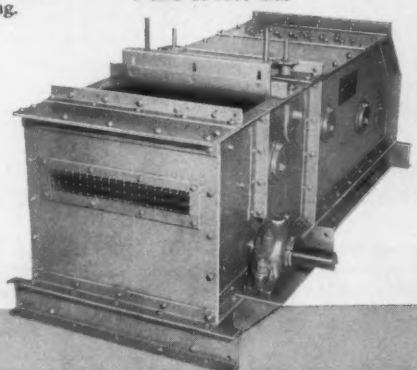
Molding Hoppers and Gates, a typical Newaygo engineered installation showing a bank of 19 overhead molders' hoppers serving cope and drag floors and squeezer molders. Emphasis is on maximum mold preparation with minimum fatigue.

Pivoting Flask Filler, a high speed, high capacity belt-type feeder Newaygo designed to receive sand from storage hoppers, plate feeders, belt conveyors or elevators. Spreads sand uniformly in large flasks on rollover machines or for floor molding.

Rotary Plate Feeder

Positive volume feeder supplying a steady controlled flow of sand from 0 to over 100 tons per hour. Newaygo engineered to prevent spillage, sticking or bridging. Standard sizes 3, 6, 8 and 10-foot dia.





Aerator

A patented Newaygo design, this high speed aerator blends, tempers, cools and aerates sand more thoroughly than is possible by any other method.

Full information and specifications on all Newaygo Foundry Equipment are contained in Bulletin No. 56. Send for your free copy.

"Foundry Business is **BIG** *Business"*

NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

MAINTENANCE

. . . of electric furnaces is a man-sized job. The men who know their furnaces know how to keep them on the go. They also know that a **GLC graphite electrode column with the "weld-strength" Unitrode® nipple** makes better steels at lower cost.

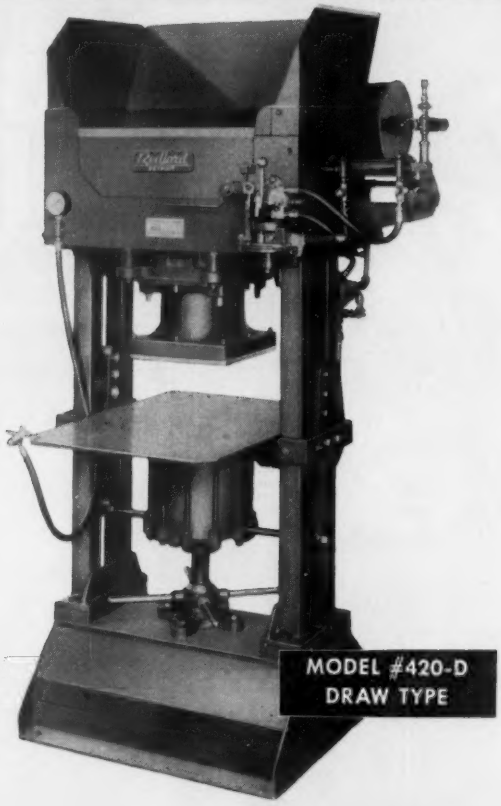
FREE—*This illustration of one of the skills employed by the men who make the metals has been handsomely reproduced with no advertising text. We will be pleased to send you one of these reproductions with our compliments. Simply write to Dept. F-2.*

ELECTRODE GLC® DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y. OFFICES IN PRINCIPAL CITIES

Circle 571 on Page 51



Redford CORE BLOWER AND CORE SHOOTER

Here is a core making machine that is setting new standards in versatility and performance. The #420 Redford is equipped *to make cores up to 20 lbs. using any type binder.* Proven core blowing practices may be continued to do the most intricate work and to assure maximum production. Tough sand mixes which do not readily lend themselves to blowing can be used in ramming or shooting cores.

Core shooting requires a fast acting machine having sufficient capacity to propel sand at high velocity through a large shoot head opening. The large shoot head opening offers little resistance to the flow of sand and allows any sand to be rammed into suitable open cavity core boxes ahead of the propelling air.

With the #420 Redford we offer a tool that allows you the widest choice of application. It is a properly balanced combination of standard Redford practices that makes possible a low cost machine of greater usefulness and versatility to meet today's core room requirements.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

For Complete Information write for
BULLETIN #42

THE RIGHT ALLOY FOR ANY FOUNDRY NEED

ELECTROMET offers a complete line of ladle and cupola addition agents

ALLOYS FOR LADLE ADDITIONS

Ferrosilicons (50%, 75%, 85%, and 90%) In grades and sizes suitable for all conditions in the iron foundry. Silicon reduces chill in thin-section gray iron castings.

"SMZ" Alloy—A strong, super-graphitizing alloy and chill reducer. Contains zirconium and manganese to enhance the inoculating properties.

Calcium-Silicon—Inoculant for reduction of chill and for developing high-tensile strength. Especially suited for use in low carbon-equivalent irons.

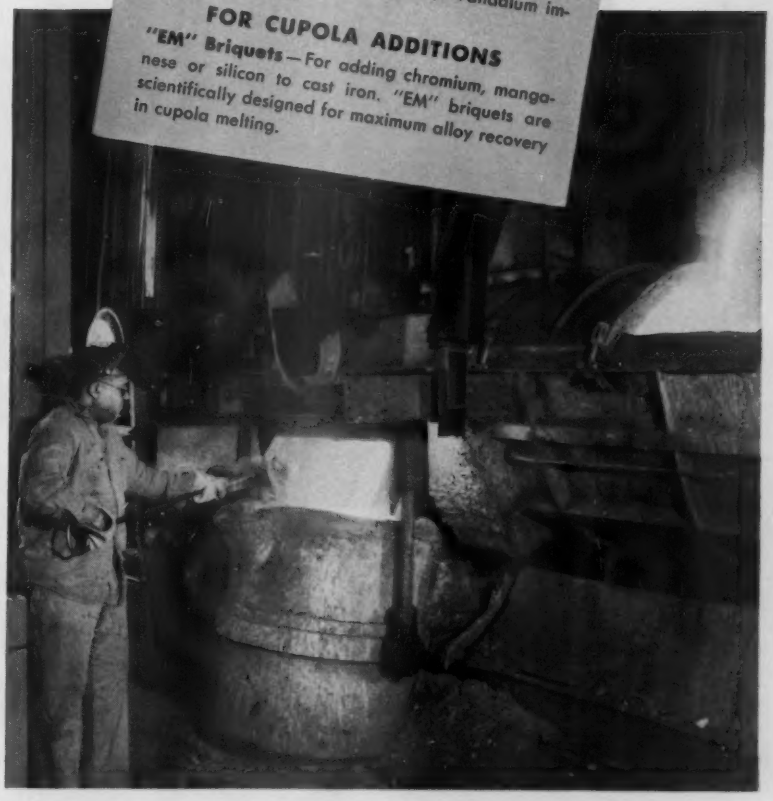
Zirconium Alloys (12 to 15% and 35 to 40%) Graphitizers for reducing chill, aiding machinability, and improving tensile properties.

Ferrochromium Alloys—Available in many grades for cast iron. All grades have rapid solubility. Widely used to improve the hardness, strength, and heat and wear resistance of cast iron.

Ferrovanadium—ELECTROMET foundry grade ferrovanadium has good solubility. Vanadium improves toughness.

FOR CUPOLA ADDITIONS

"EM" Briquets—For adding chromium, manganese or silicon to cast iron. "EM" briquets are scientifically designed for maximum alloy recovery in cupola melting.



Additions of ferro-alloys will adjust the composition of the base iron to make it suitable for the particular work on hand. You can reduce chill in thin-sectioned castings or improve strength and machinability. You can, if desired, increase hardness and improve resistance to wear and heat-all through the simple addition of alloys. And there's an ever wide variety of ELECTROMET alloys to choose from.

ELECTROMET not only has the alloys to meet your needs, but also furnishes technical assistance in their most effective use. Please phone or write the ELECTROMET office nearest you for detailed information on these or other ELECTROMET products.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N.Y. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

METALS DO MORE ALL THE TIME ... THANKS TO ALLOYS

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

Nation-wide service through these conveniently located offices:

Birmingham • Chicago • Cleveland • Detroit • Houston
Los Angeles • Phillipsburg, N.J. • Pittsburgh • San Francisco

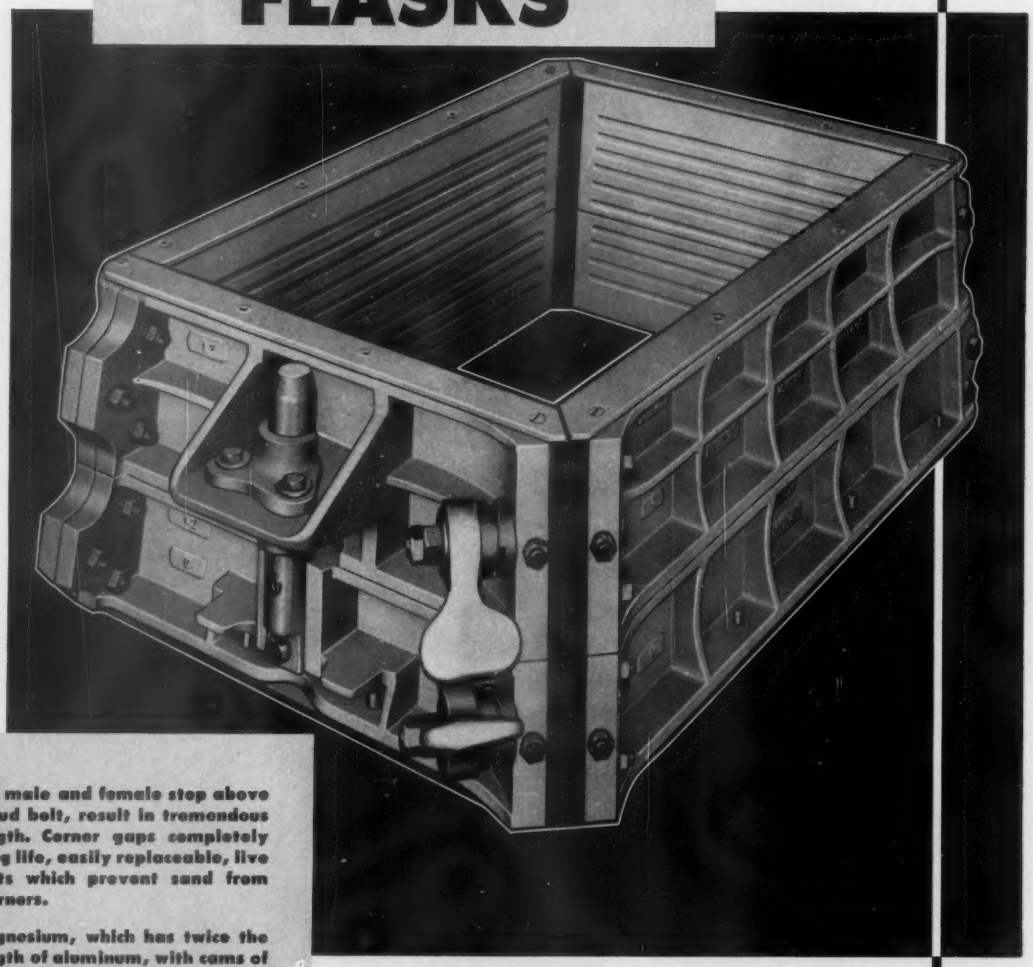
The terms "Electromet," "EM," "SMZ" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Circle 573 on Page 51

No Other Flask Gives You All These Advantages

sturdy **Fremont**

SPREADLOCK FLASKS



■ **Two-piece male and female stop above and below stud bolt, result in tremendous corner strength. Corner gaps completely closed by long life, easily replaceable, live rubber inserts which prevent sand from lodging in corners.**

Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spreadlock assures long service.

Magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.

Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure exacting work.

Write today for free literature and prices.

The Fremont FLASK Co.

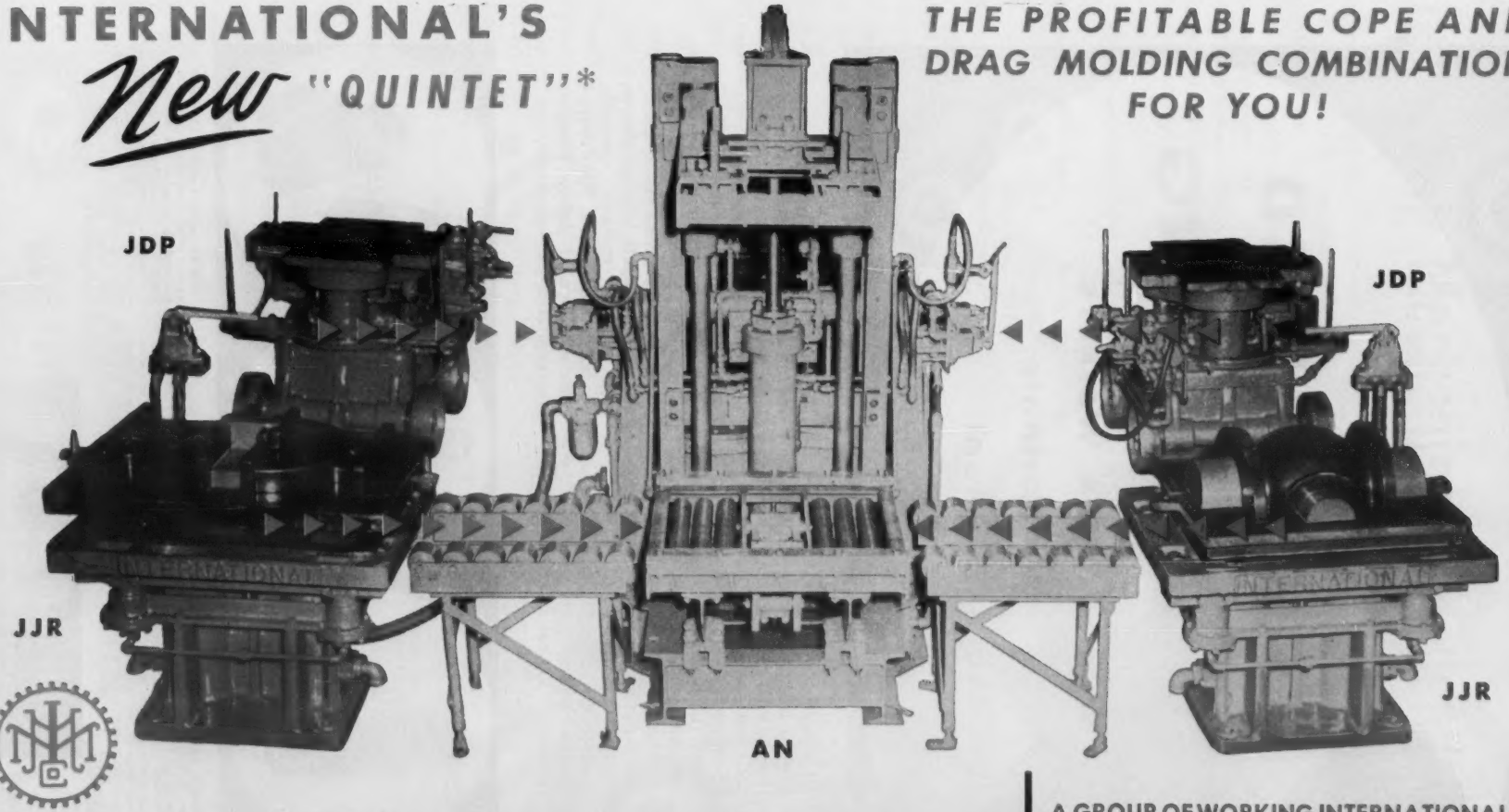
FREMONT, OHIO

Circle 574 on Page 51

Circle 575 on Page 51→

INTERNATIONAL'S *New* "QUINTET"*

THE PROFITABLE COPE AND DRAG MOLDING COMBINATION FOR YOU!



JJR—DOUBLE JOLT MACHINE

Has double jolt feature and is sturdily built to give positive ram throughout core or mold. Jolt capacities range from 750 lbs. to 12,000 lbs.

JDP—COPE MACHINE

Adaptable to large range of work suitable to pin lift style and readily adjustable. Exclusive feature is its positive jolt and true ram accomplished by use of double jolt section combined in one integral part. Will handle loads from 750 lbs. to 3000 lbs.

AN—TURNOVER and DRAWING MACHINE

For clamping and turning over core boxes or flasks and for drawing the core or mold. Easily handles hard-to-draw, short runs and many different sized jobs. No rigging time is required. Capacity—750 lbs. to 10,000 lbs.

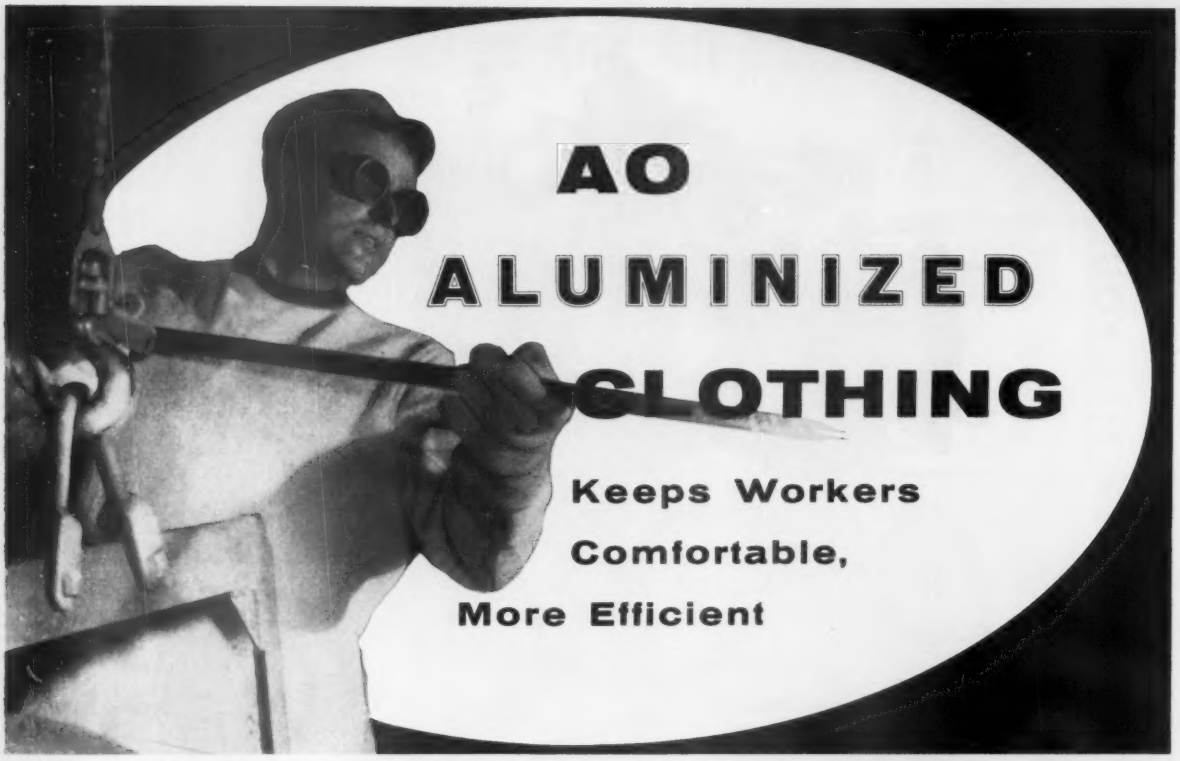
A GROUP OF WORKING INTERNATIONALS

These individual machines are in combination to give you a complete cope and drag molding setup for both short and long production runs.

Investigate International's New Working Quintet Today! Just write us a note telling your cope and drag sizes, and our engineers will plan the best combination for your particular needs. NO OBLIGATION!

*International's System, illustrated by the "Quintet" shows just one of the many possible combinations.

INTERNATIONAL MOLDING MACHINE CO.
LA GRANGE PARK, ILLINOIS



210RA Chaps. Complete frontal protection waist to foot. Two leather straps around back of leg with full circle construction at leg bottom. Aluminized Duck — 210RD

It reflects 90% of radiant heat . . . weighs less than 50% of regular asbestos with good abrasion resistance . . . but above all it keeps workers cooler, more comfortable, more efficient! These are the big advantages of American Optical Aluminized Clothing. What's more coating resists peeling or cracking and under normal conditions provides excellent service.

American Optical Aluminized Asbestos clothing is recommended for protection against high heat (including direct radiation), sparks and molten metal splashes in cupola and ladle pouring, open hearth, blast and electric furnace tapping and similar exposures. (American Optical Aluminized Duck is recommended where exposures are basically radiant heat.) Available in jackets, coats, pants, chaps, aprons, spats, leggings, sleeves, cape sleeves, overalls, coveralls, hoods, gloves, mittens. Your nearest American Optical Safety Products Representative can supply you.

1481RA Spring Type Legging. A best seller because no adjustments are necessary. Easy on, easy off! Spring steel frame does double job — protects leg, provides air insulation area between leg and legging. Chrome tanned leather flare with spring clip. Aluminized asbestos on upper part. Aluminized Duck — 1482RD

7X160RA Legging and 7X161RA Spat. Another popular legging because of unusual design. Spring clip on chrome tanned flare. 3 positions at top and 2 at ankle for steel stay provide snug fit, quick release. Upper part aluminized asbestos Aluminized Duck — 7X160RD and 7X161RD.

204RA Coat. Completely protects upper body Wool collar protects neck. Snap fasteners on cuffs for snug fit. All snap fasteners on front have leather-pull tabs for quick removal. All seams double-stitched. Six standard coat lengths. Aluminized Duck — 204RD.

10RA Sou'wester and 1X115 Cowl Hoods. 10RA (Sou'wester type with permanently attached bib) provides ample protection to head and neck. Bib has one-piece lookout of clear glass 2" x 4¼". 3 sizes. Cowl hood has snap fastener adjustment. 3 cowl sizes. Aluminized Duck — 10RD and 1X117.

Always insist on Trademarked Safety Products

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Circle 576 on Page 51

Circle 577 on Page 51→

Exclusive with the Heroult:

Operating Mechanism Independently Supported

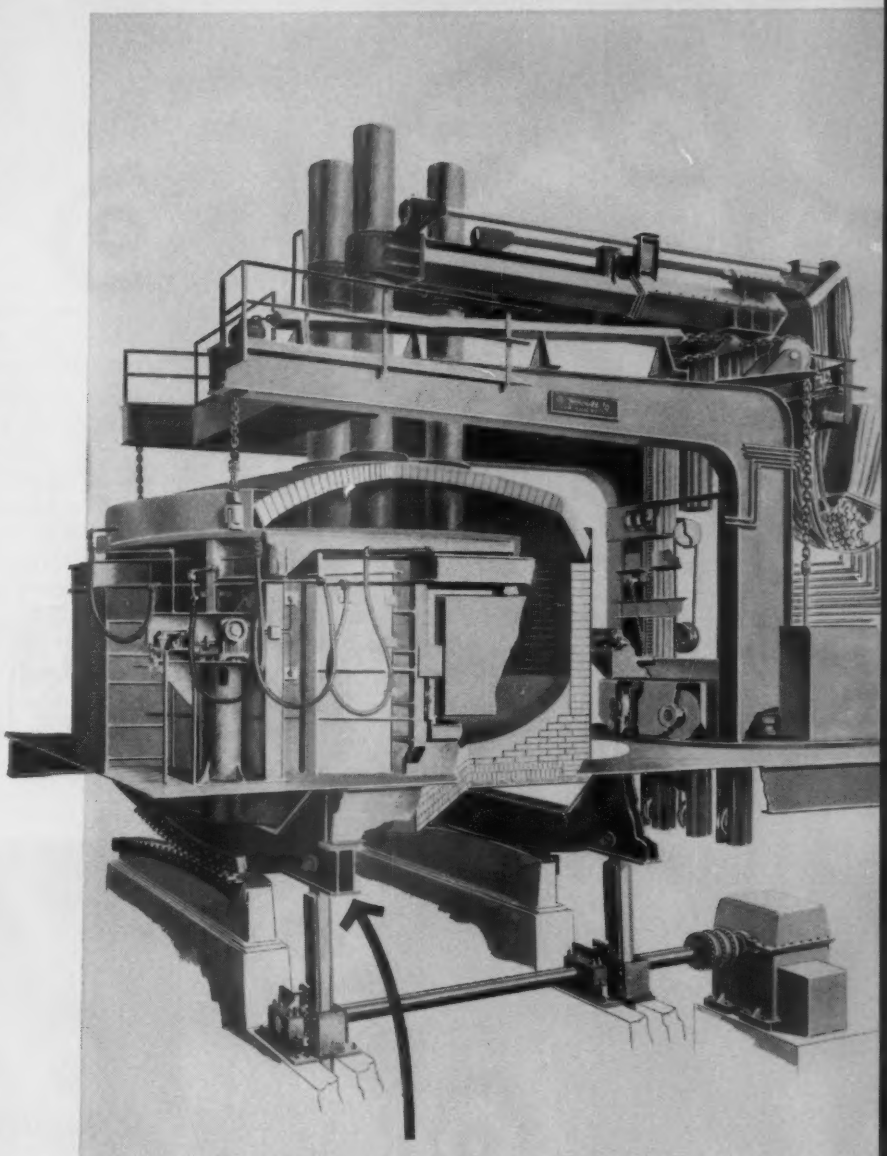
In Heroult's specially designed **new** furnaces the operating mechanism is located on the tilting platform, supported on rockers completely separate from the cage shell. In the event of shell warpage due to overheating, the mechanism remains unaffected and efficient production continues free from maintenance delays.

The independently supported operating mechanism which contributes to lower operating costs, and helps cut maintenance outlays to a fraction of former rates, is only one of the advanced design exclusives offered by the **new** Heroult for increased production efficiency. There are four others ready to operate on your behalf:

1. **Flat-bottom shells, for simplified relining jobs and good bath temperature distribution.**
2. **Water-cooled skew back roof ring, eliminates need for special roof refractories.**
3. **Cage-type shell construction, minimizes shell distortion and facilitates replacement of damaged shell plates.**
4. **100% mechanical operation, for reliability and ease of maintenance.**

There is a wide range of **new** Heroult Furnaces with shell sizes from 7′0″ up, and with capacities from 6000 to 400,000 pounds. You can obtain them with non-magnetic induction stirring equipment, top charge, door charge, and special duplexing. Non-ferrous furnaces are also available.

The pioneers and leaders in this field for 52 years, Heroult specialists in electric furnaces can help you select and install the equipment best suited to your current and future needs. Get in touch with our nearest contracting office—today—for complete information.



USS

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION, GENERAL OFFICES:
525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in New York, Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

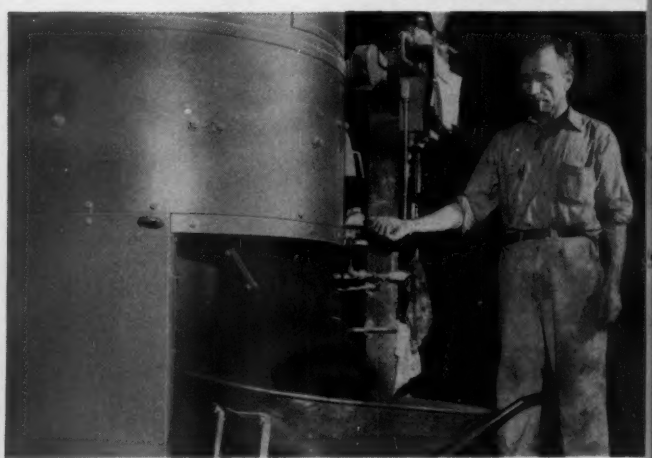
Heroult
ELECTRIC
MELTING FURNACES

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

CASTING INGENUITY SOLVES MONEL IMPELLER

INDUCTION CAST BY WOLLASTON BRASS



"If the muller were a maintenance problem our operation would be impaired" . . . says E. F. Tibbetts of this No. 1-F Simpson Mix-Muller used to prepare all the green sand at Wollaston Brass and Aluminum Foundry Inc., North Quincy, Mass.

PROBLEM THAT STUMPED PUMP DESIGNERS

SIMPSON MIX-MULLERS contribute to versatility of Wollaston Brass speciality foundry!

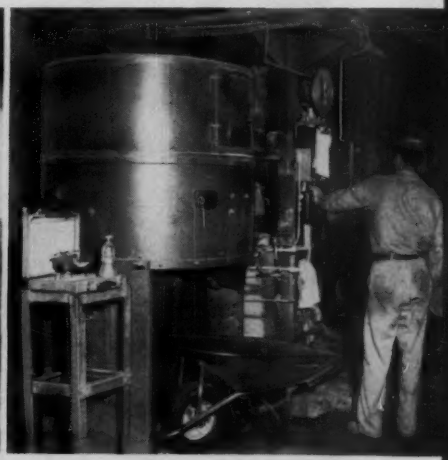
Wollaston Brass and Aluminum Foundry Inc. of North Quincy, Mass. do a brisk speciality jobbing business with a clean, modern and well equipped shop that is set up to handle unusual stainless, monel and nickel jobs. A recent contract, calling for a special high nickel alloy steel pump impeller, was completed by Wollaston—after many foundries, including the pump designer, had found it impossible to produce through their own casting facilities.

Owners Edward H., Frank and R. C. Tibbetts will tell you that careful sand control and precise metallurgy are the secret to Wollaston's unique reputation in producing these specialized jobs. That's why the Simpson Mix-Mullers were put into service upon their recent change-over from natural to synthetic sand. Of their year-old Number 1-F Simpson Mix-Muller E. F. Tibbetts, vice president, of the Wollaston firm has this to say: "*This muller has been in constant use every day since its installation without any difficulty whatever. With continued increase in overall business volume our change-over from natural sand to synthetic has been all the success we hoped for . . . If the muller were a maintenance problem our operation would be seriously impaired. We are glad we decided on a Simpson.*"

Specialized metal jobs may not be numbered among *your problems*. But if you cast metals your sand requires, and will get, the same thorough, efficient *controlled* mulling and the same dependable day-in and day-out service that has made the Simpson Mix-Muller a partner in the progress of improved metal casting—the world over.

SIMPSON PORTO-MULLER sees heavy duty in preparing all core sand used by this speciality foundry.

CAREFUL CONTROL helps Wollaston Brass maintain an enviable record of success on highly specialized casting jobs.



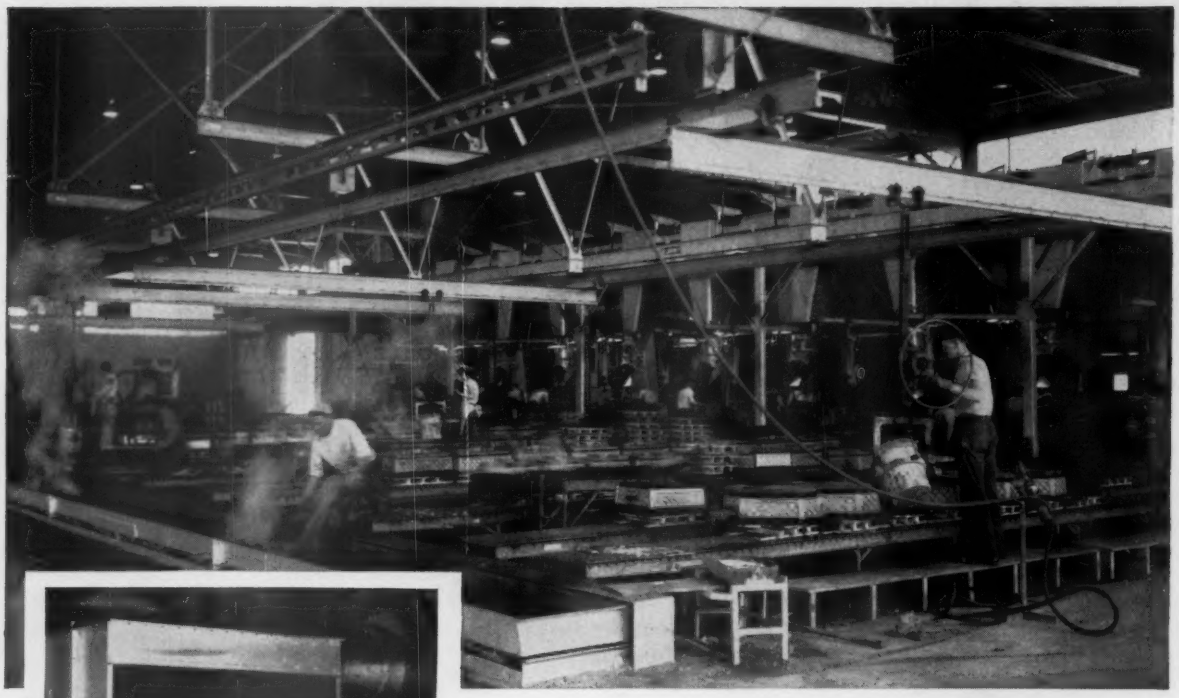
NO. 1-F MIX-MULLER is equipped with time and labor saving, straight lift Bucket Loader and accurate water additions meter.

NATIONAL Engineering Company

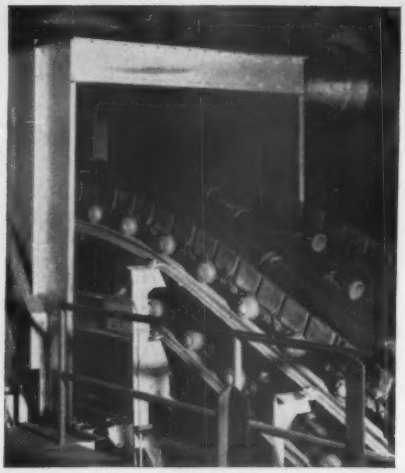
646 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON MIX-MULLERS • SHELL-MULL • MOLDER'S HELPER
TIMEMASTER • SCREENMASTER • COMPLETE ENGINEERING SERVICE

Circle 578 on Page 51



Machine-made fittings for cast iron soil pipe are made with a high degree of automation . . . via time-tested Jeffrey foundry equipment.



Jeffrey apron conveyors hustle new Charlotte-Spun® pipe from casting machine to cleaning and inspection facilities.

Charlotte Pipe meets challenge with

automatic pipe foundry

Jeffrey equipment has put soil pipe and fittings production on a fast track at Charlotte Pipe and Foundry Company's new multi-million dollar plant.

Production of cast iron soil pipe and fittings in this plant represents a major advance in foundry techniques. It involves a patented process using centrifugal force to distribute molten iron uniformly within metal molds lined with sand. Electronically-controlled machines produce smooth, seamless, easy-to-cut pipe.

Jeffrey-built sand conditioning equipment, belt conveyors, leakproof apron conveyors and bucket elevators are stepping up efficiency by mechanized movement of sand, pipe and fittings at this new North Carolina foundry.

Jeffrey engineering service will help make *your* foundry more productive, more profitable . . . with Jeffrey unit machines or a completely engineered foundry system. The Jeffrey Manufacturing Co., 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

Circle 579 on Page 51

"We have been well pleased..."

writes a foremost manufacturer about the metal-melting protection of Norton refractories

High melting, long-lasting ALUNDUM*, CRYSTOLON*, MAGNORITE*, FUSED STABILIZED ZIRCONIA and other Norton refractory materials are Norton ℞'s — *engineered and prescribed* for longer, lower cost service across the range of furnace applications.

For ℞'s that will help you maintain hot metal schedules and reduce shutdowns in your own processing, call in your Norton Refractories Engineer. Or write to NORTON COMPANY, Refractories Division, 301 New Bond St., Worcester 6, Mass.

VACUUM METALS CORPORATION
DIVISION OF CRUCIBLE STEEL COMPANY OF AMERICA
P. O. BOX 977 SYRACUSE 1, N. Y.
SYRACUSE 6-2571

March 27, 1957

Norton Company
Worcester 6
Massachusetts

Gentlemen:

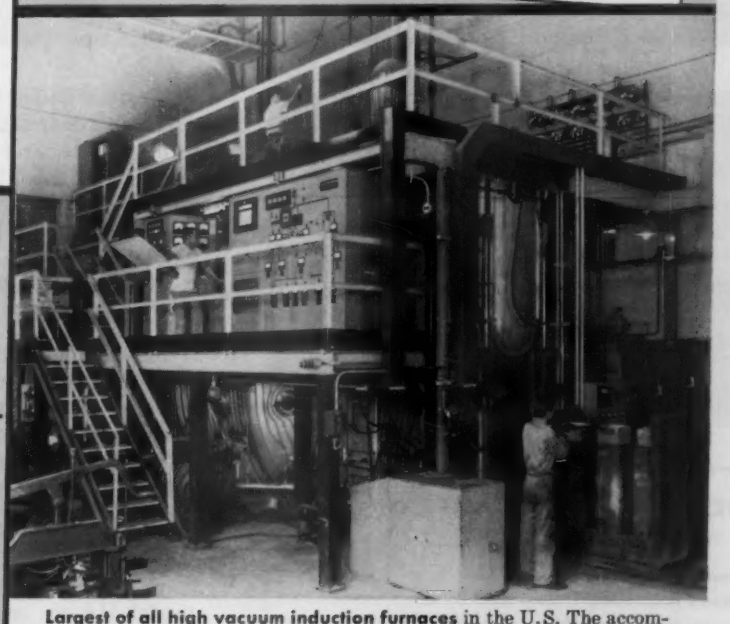
I am enclosing a general view of our newest vacuum melting furnace and a view of the crucible during a melt. This furnace is the largest high vacuum induction furnace in the country and has a capacity of 3000 pounds per heat.

We have successfully used a Norton ramming mix for rammed linings in this and in our 700 pound furnace. Your prefired shapes of Magnorite and Alundum have been used for pouring lips and pouring tubes. Your refractory ramming mixes have been used as a backing for Norton Magnorite and Alundum crucibles in laboratory furnaces for nearly ten years. We have been well pleased with the quality and performance of your products.

Very truly yours,

A. E. Franks
Division Superintendent

AEF/a
cc: Michael Stumm



Largest of all high vacuum induction furnaces in the U.S. The accompanying letter from Vacuum Metals Corporation, a Division of Crucible Steel Company, describes how Norton refractory cements and prefired shapes aid in the advanced performance of this huge, modern metal-melting equipment.

NORTON
REFRACTORIES
Engineered... ℞ ...Prescribed

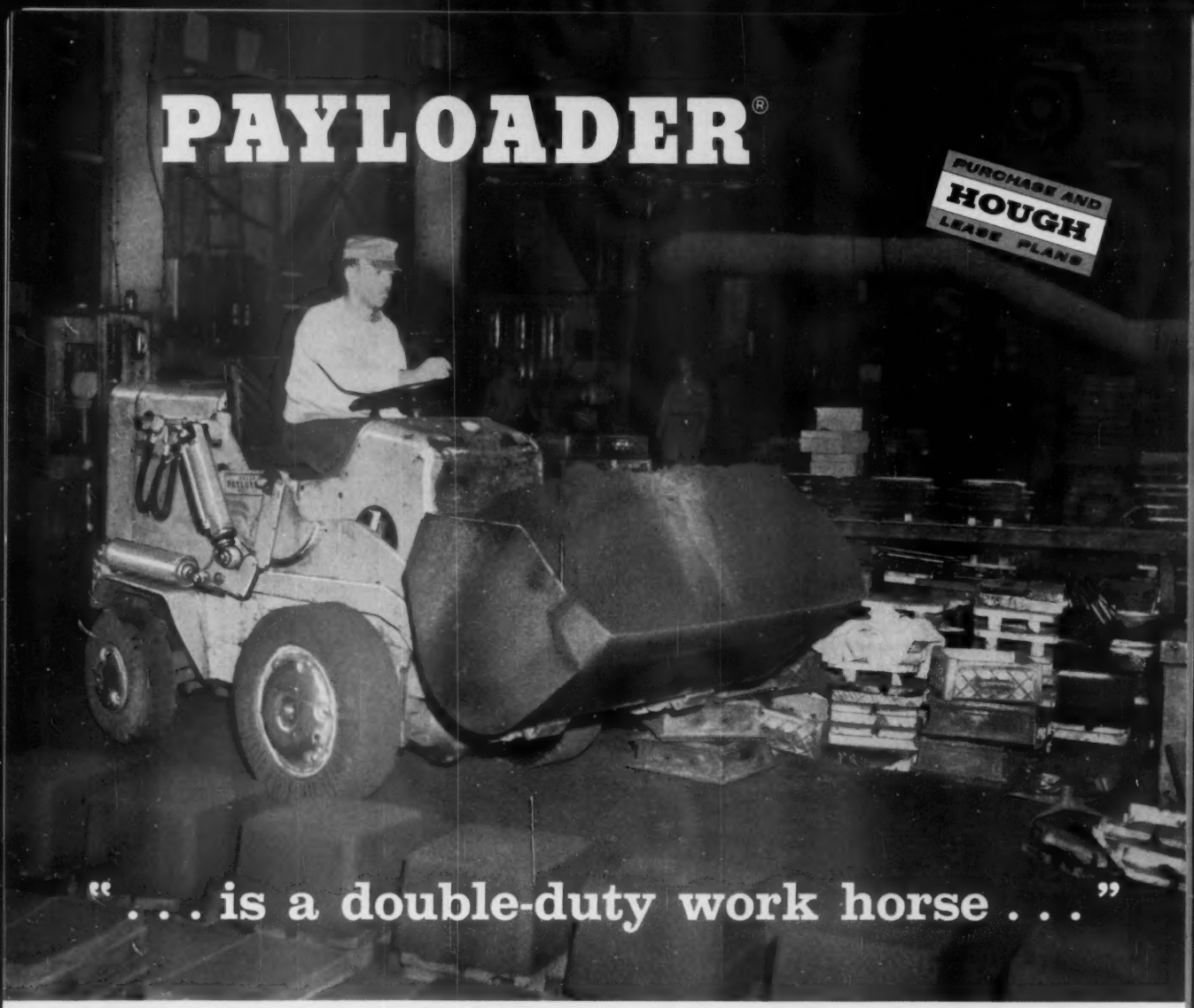
Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Behr-cat Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

PAYLOADER®

PURCHASE AND HOUGH LEASE PLANS



"... is a double-duty work horse ..."

Ludlow Valve Mfg. Co., Inc., Troy, N. Y. is a pioneer in gate valve manufacture for nearly a century. It has its own iron, bronze and steel foundries in which it uses two "PAYLOADER" tractor-shovels to speed its sand and coke handling operations. Master Mechanic Mr. Windover calls their 3 year-old roll-back model HA "PAYLOADER" "a double-duty work horse ... standing up under a 16-hour day with normal maintenance and annual check-ups. The most trouble-free machine I ever had on the job."

The model HA has a payload capacity of 18 cu. ft. — the largest capacity of any tractor-shovel in its size range — can negotiate corners and narrow aisles where others can't operate. It features 40° bucket roll-back at ground level, one-lever bucket control, torque-converter drive. Hydraulic load-shock-absorber, an exclusive standard feature, cushions the loaded bucket reducing jounce and bounce and permitting higher load-carrying speeds with less materials spillage.

Your Hough Distributor will gladly demonstrate the new model HA or larger model HAH. Ask him about Hough Purchase and Lease Plans too.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

- ☐ Model HA (2,000 lb. carry cap.)
- ☐ Model HAH (3,000 lb. carry cap.)
- ☐ Larger models (to 9,000 lb. carry cap.)

Name.....
Title.....
Company.....
Street.....
City.....State.....
2-A-2

SAY "HUFF"

Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

LIBERTYVILLE, ILLINOIS
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Circle 581 on Page 51

Late News

SURVEYS '58 OUTLOOK: Results of the Business and Defense Services Administration's annual survey of major industries indicates a moderate optimism about 1958 operations. Continued strength is seen in building and highway construction, and a lower operating level is anticipated for steel and autos. Consumer durable goods sales are expected to maintain the 1957 level. A 10 to 15 per cent rise in sales of farm equipment and tractors is predicted, and some increase in oil field machinery and equipment is looked for. The machine tool industry expects a further decline. In the general industrial equipment field, the consensus leans toward cautious optimism. Ferrous castings are expected to show a gradual increase, particularly in the third and fourth quarters. Railroad freight car production may be off from 20 to 30 per cent during the first six months of the year, but a pickup is predicted during the last half.

AIRCRAFT CASTINGS STUDY: Chance Vought Aircraft Inc. has been awarded an Air Force contract for $1,093,854 to study development of processes for casting high-strength steels for aircraft.

AFS NAMES 1958-59 OFFICERS: The nominating committee of AFS has selected Lewis H. Durdin, Dixie Bronze Co., to serve as president of the society during 1958-59. Charles E. Nelson, Dow Chemical Co., was nominated for vice president during the same term. Six men were selected to serve as directors for 3-year terms: David W. Boyd, Engineering Castings Inc.; T. W. Curry, Lynchburg Foundry Co.; R. R. Deas Jr., Hamilton Foundry & Machine Co.; Jake Dee, Dee Brass Foundry; Webb L. Kammerer, Midvale Mining & Mfg. Co., and H. M. Patton, Foundry Div., American Hoist & Derrick Co.

1958 AFS AWARDS: The AFS Board of Awards has recommended the following awards for presentation at the 1958 AFS Castings Congress, Cleveland, May 19-23: Thomas W. Pangborn Gold Medal, to Ralph A. Clark, Electro Metallurgical Co., Div. of Union Carbide Corp.; William H. McFadden Gold Medal, to Howard J. Rowe, Aluminum Co. of America; Joseph S. Seaman Gold Medal, to William W. Maloney, AFS. Awards of Scientific Merit have been recommended for Mervin H. Horton, Deere & Co.; Kenneth H. Priestley, Vassar Electroloy Products Inc.; and Franklin B. Rote, Albion Malleable Iron Co. Selected for Service Citations are Frank S. Brewster, Brumley-Donaldson Co.; Ernest T. Kindt, Kindt-Collins Co.; and Fred G. Sefing, International Nickel Co.

FEF CONFERENCE: Leading engineering educators and foundry industry executives will gather in Cleveland at the Hotel Statler on Mar. 12 and 13 for the 11th annual Foundry Educational Foundation College-Industry Conference. The conference will be geared to the theme "Science and Engineering—the Key to the Foundry Industry's Future." Two panel discussions are scheduled, to cover new aspects of engineering education in cast metals and to develop an expanded FEF program.

PLANT PURCHASES: National Malleable & Steel Castings Co., Cleveland, has acquired Grand Rapids Plating Co. and its subsidiary, Grand Rapids Die Casting Co., both of Grand Rapids, Mich. . . . Assets of Fanner Mfg. Co., Cleveland, have been sold to Textron Inc., a New England company with diversified interests. . . . Precision Founders Inc., San Leandro, Calif., has purchased Mars Mfg. Co., San Francisco, to increase wax injection die-making capacity at the San Leandro plant . . . Delta Oil Products Co., Milwaukee, has been sold to Wisconsin Independent Oil Co.

OBITUARY: George P. Madison, 82, died Jan. 20. Identified with the foundry industry for 50 years, he retired from Plaster Process Castings Co., Cleveland, in 1945. . . . Leo N. Newman, executive vice president and general manager, Josam Mfg. Co., Michigan City, Ind., died Jan. 20. . . . Dr. Willis R. Whitney, 89,

founder of the General Electric Research Laboratory in 1900 and an honorary vice president of the company, died Jan. 9.

PERSONALS: George S. Pusey has been appointed superintendent of a new foundry to be established by International Harvester Co. at Santo Andre, Brazil, where a company plant produces trucks. He formerly was coreroom superintendent in the Harvester works in Milwaukee . . . Brinton Welser, senior vice president and a director of Chain Belt Co., Milwaukee, has retired . . . Edward E. Mueller has been elected president of Whirl-Air-Flow Corp., manufacturer of pneumatic sand conveying equipment. He was president of Foundry Supply Co., Minneapolis, until he joined W-A-F last September. New vice presidents of W-A-F are Ray G. Pence, George W. Anselman, and G. L. Babcock . . . Ralph L. Lee, secretary and treasurer of Grede Foundries Inc., Milwaukee, has retired. He has been succeeded by Edwin W. Schenck . . . Harry G. McMurry has been appointed plant manager of the new Ford Motor Co. aluminum castings plant at Sheffield, Ala. . . . Carter Kissell has been elected president of National Malleable & Steel Castings Co., Cleveland, succeeding Cleve H. Pomeroy, now board chairman.

MISCELLANY: Site of the 60th annual meeting of the National Foundry Association Nov. 20-21 will be the Drake Hotel, Chicago . . . Pratt & Letchworth Div., Dayton Malleable Iron Co., Buffalo, will discontinue production of miscellaneous steel castings and confine its operations to railroad specialties. A substantial part of the plant will be put up for sale, and about $750,000 will be spent during the next two years to modernize facilities for the production of railroad castings . . . West Point Foundry & Machine Co., Div. of Batson-Cook Co., West Point, Ga., is moving its foundry operations into a new, 20,000-sq-ft plant 1 mile north of West Point . . . Roper Industries Inc. will close down its gas range and foundry operations at Rockford, Ill., by Apr. 1. It will continue to make hydraulic equipment and pumps at Rockford . . . More than 75 tons of liquid oxygen, nitrogen, and argon will be produced daily at the new $7\frac{1}{2}$ million air liquefaction plant of Air Reduction Pacific Co. in Los Angeles. Parent firm is Air Reduction Co., New York.

Prices of Foundry Metals and Coke

(As of Jan. 27, 1958)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 26.25; tin bronze, No. 225, 35.00; No. 245, 29.75; high-leaded tin bronze, No. 305, 30.25; No. 1 yellow, No. 405, 21.75; manganese bronze, No. 421, 23.50.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy, 21.50-23.25. Deoxidizing grades: No. 1, 23.50; No. 4, 18.50.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 25.00, delivered Connecticut valley.

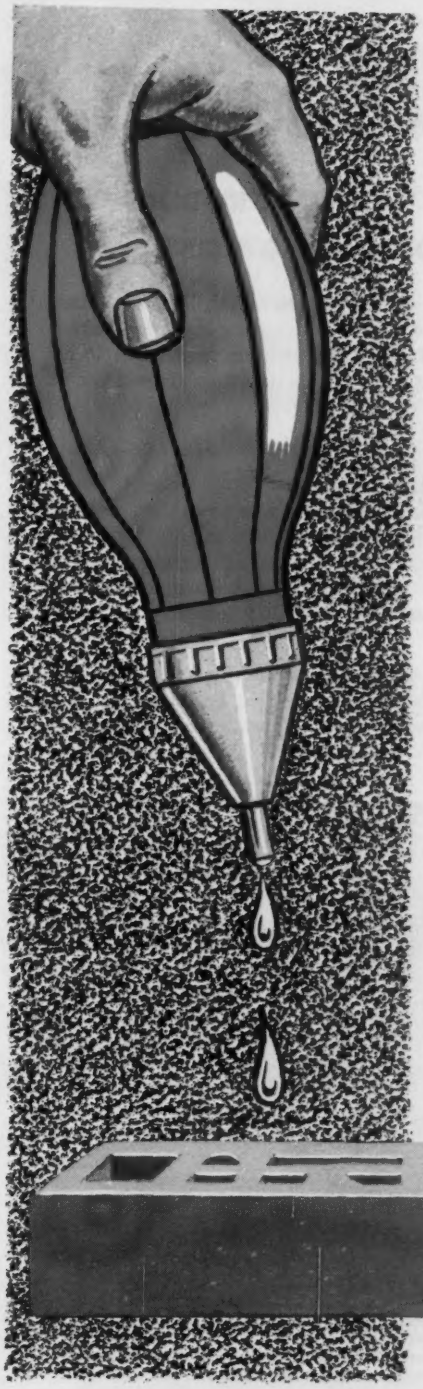
ZINC: High grade 11.35 delivered. Die casting alloy No. 3, 14.25; No. 2, 15.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwised noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$29.00-30.00	$49.00-50.00	.....	.....	.....	.....	$48.00-49.00
Boston*	**24.00-25.00	**29.00-30.00	.....	.....	**35.00-36.00	.....	.....
Buffalo	28.00-29.00	**36.00-37.00	.....	.....	**41.00-42.00	.....	46.00-47.00
Chicago	33.00-34.00	39.00-40.00	.....	45.00-46.00	45.00-46.00	48.00-49.00	53.00-55.00
Cincinnati*	**28.00-29.00	**36.00-37.00	**33.00-34.00	.....	**47.00-48.00	.....	**52.00-53.00
Cleveland	27.00-28.00	41.00-42.00	32.00-33.00	43.00-44.00	43.00-44.00	55.00-56.00	55.00-57.00
Detroit*	**22.00-23.00	**29.00	**22.00	**30.00	.....	**31.00	.....
Los Angeles	36.00	**41.00	.....	.....	.....	.....	.....
New York*	34.00-35.00	34.00-35.00	32.00-33.00	.....	.....	.....	.....
Philadelphia	37.00-38.50	38.00	39.00	.....	49.00	56.00	58.00-60.00
Pittsburgh	32.00-33.00	38.00-39.00	.....	42.00-43.00	49.00-50.00	.....	55.00-57.00
St. Louis*	32.00	42.00	32.00	44.00	.....	.....	48.00
San Francisco	34.00	43.00	30.00	42.00	42.00	.....	.....
Seattle	30.00	31.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point



Drop by Drop . . . IN 1957

FOUNDRYMEN USED

213 TONS OF

LYQUAGRIP*

READY-TO-USE CORE PASTE

FOR THESE 12 ADVANTAGES

1. Unsurpassed for pasting CO^2 cores
2. Ready mixed, uniform at all times
3. Light colored, odorless, non-corrosive, non-fermenting
4. Dries rapidly at room temperatures
5. Unaffected by normal storage
6. Will not boil or blister
7. No appreciable gas generation
8. Pasted joints are stronger than core
9. Unaffected by mold humidity
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

Ask for literature or consult our representative

*Trade Mark Reg.

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of

LYQUAFLOUR
For cleaner surfaces, better shakeout

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The Liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

DUO RESIN
Binder for baking with controlled oven temperatures

Circle 582 on Page 51

For Maximum Control and Efficiency . . .

FAST INDIRECT ARC MELTING, ROCKING ACTION PRODUCE CLOSE QUALITY CONTROL AT LOW OPERATING COST

Detroit Electric Furnaces offer three basic advantages for metal melting: Indirect arc heat for uniform high quality; controlled rocking action for maximum heat utilization and homogeneous alloy mixture; and quick shell interchange for economical melting of different alloys.

Close Control of Analysis

By using an indirect arc in a sealed chamber, Detroit Electric Furnaces produce alloys of consistent analysis through heat after heat. Electrodes remain clear of the molten bath at all times. The sealed chamber holds gaseous contamination to a minimum. Melting is rapid, yet final pouring temperature can be duplicated or varied at will.

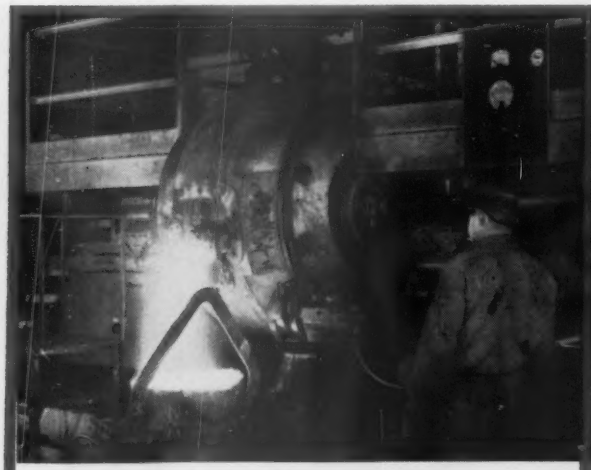
Double Economy with Rocking Action

Automatic rocking action washes the metal over a greater surface of the lining. This provides fast, efficient metal melting and stirs the bath constantly to assure homogeneity of the metal. Rocking action prolongs lining life by preventing excessive refractory temperatures. The optimum melting cycle for any particular heat can be determined then preset with the rocking controller.

Vary Production Schedules, Melt Different Alloys Easily

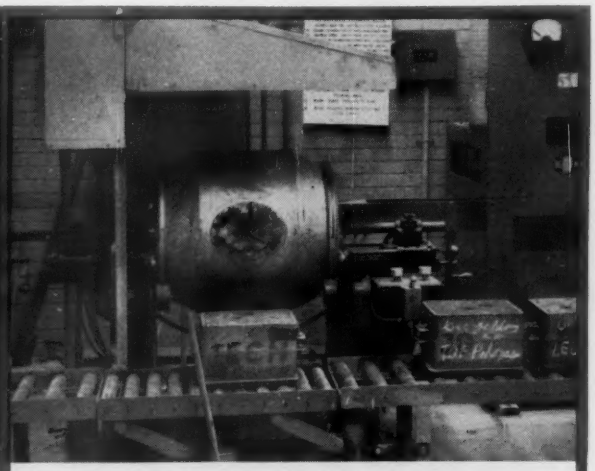
Detroit Electric Furnaces are designed to meet diversified melting requirements as well as long run schedules. Using the size furnaces suited to your production volume, a wide range of ferrous and nonferrous alloys can be handled with quickly interchangeable shells. This greatly lowers your initial investment.

Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your needs. Write today, or mail the coupon on the opposite page for full catalog information.



Type AA—1500 lbs. capacity

Produces 5-8 tons of metal per 8-hour shift. Pedestal-mounted electrodes with automatic arc control. Conical or cylindrical shell. 250 k.w. (brass) or 400 k.w. (iron) transformer.



Types GMS/GMT—60/100 lbs. capacity

Ideal for research and limited production. Type GMS-30 k.w. produces 800 lbs. per shift. Type GMT-50 k.w. produces up to 1200 lbs. Base-mounted electrodes. Single transformer and meter cabinet.

DETROIT ELECTRIC FURNACE DIVISION

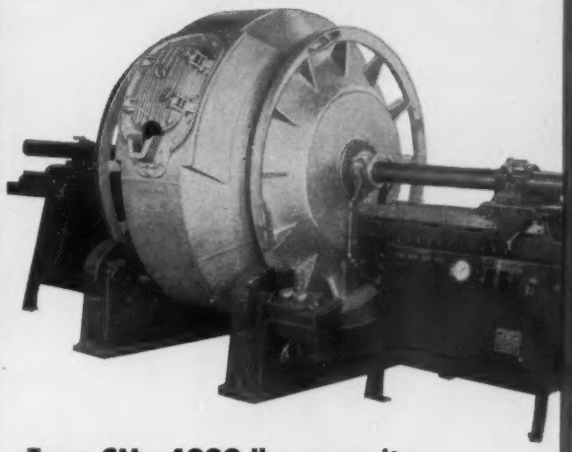
Kuhlman Electric Company

Bay City, Michigan

MEMBER FEMA

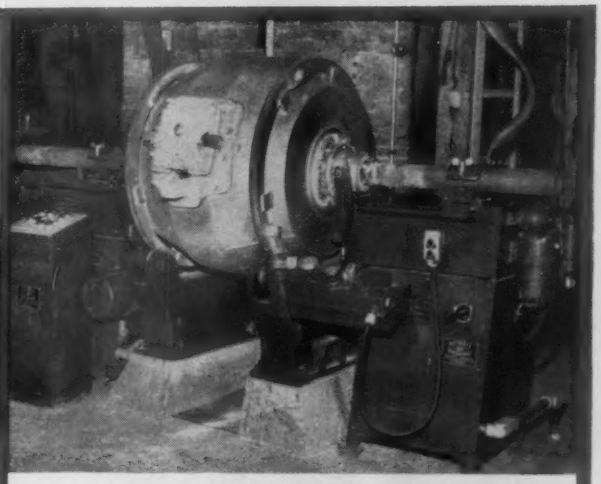
Foreign Representatives in BRAZIL—Equipamentos Industrias, "Elsa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Cassaing Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

Melt with Detroit ROCKING Electric Furnaces



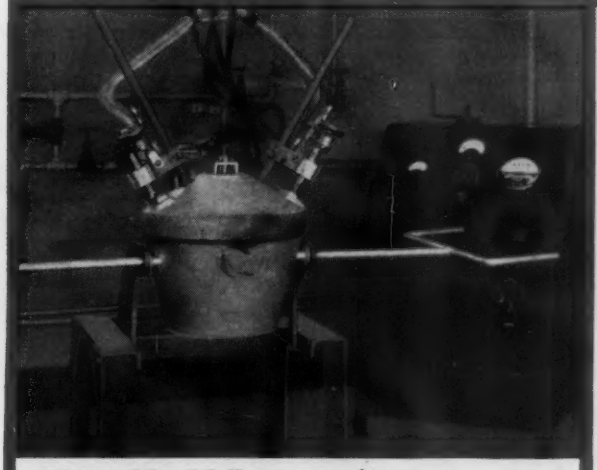
Type CM—4000 lbs. capacity

Produces 10-16 tons of metal per day. Pedestal-mounted electrodes. Conical or cylindrical shell. 400 k.w. (brass), 600 k.w. or 750 k.w. (iron) transformers. Also available: Type CC, 3000 lbs. capacity, rated at 350 k.w. or 600 k.w.



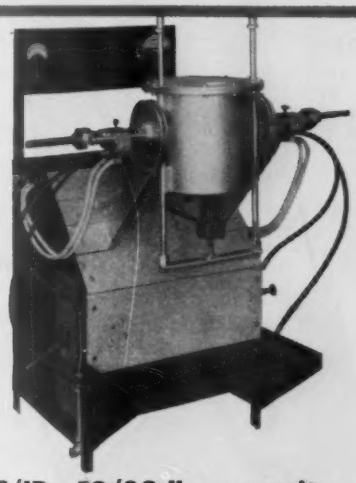
Type LFNP—500 lbs. capacity

For 2-4 tons of metal per shift. Pedestal-mounted electrodes. Conical shell. 150 k.w. transformer. Also available: Type LF-100 k.w., 200 lbs; Type LFC-125 k.w., 350 lbs; Type LFY-175 k.w., 700 lbs.



Type PT—15 lbs. capacity

Pot-tilting type for research and small production. Electrodes mounted in cover. Pot doubles as crucible. Single power unit has 12 k.w. transformer.



Type IC/ID—10/20 lbs. capacity

Investment casting type for precision castings. Type IC rated at 12 k.w., Type ID at 20 k.w. Furnace inverts to pour into attached mold.

FREE CATALOG

Detach and mail coupon for full information on Detroit Electric Furnaces.

Detroit Electric Furnace Division
Kuhlman Electric Company
Bay City, Michigan

Please send me a copy of your catalog No. 559 plus specific information on the Detroit Electric Furnaces checked at right.

Name_____ Title_____

Company_____

City_____ Zone_____

State_____

- ☐ AA
- ☐ CM
- ☐ LFY
- ☐ GMS
- ☐ PT
- ☐ IC

Fast Table Service

Easy loading and unloading of Wheelabrator® Swing Table speeds work handling

The unequalled versatility of a Wheelabrator Swing Table is the key to important savings for scores of foundries. Many castings that are impractical to clean by any tumbling process can be cleaned on a Swing Table with remarkable ease and economy. In many cases, the costly air-blast room can be eliminated.

Designed to handle a wide range of work, the Swing Table cleans mixed sizes in a single load with equal efficiency. At Alloy Steel Castings Co., Southampton, Pa., for example, castings from ½" square to 48" in diameter are cleaned in mixed loads, with no waiting to accumulate work of any given size.

The unrestricted area above the work table when the door is open permits use of mechanical loading devices for most efficient handling of any type of work. One Swing Table unit can be served by several auxiliary work tables, further reducing down-time for loading. Double-door units having a table on each door offer still greater production capacity.

For more information, write today for Bulletin 119-D suggesting money-saving applications of Swing Table equipment.

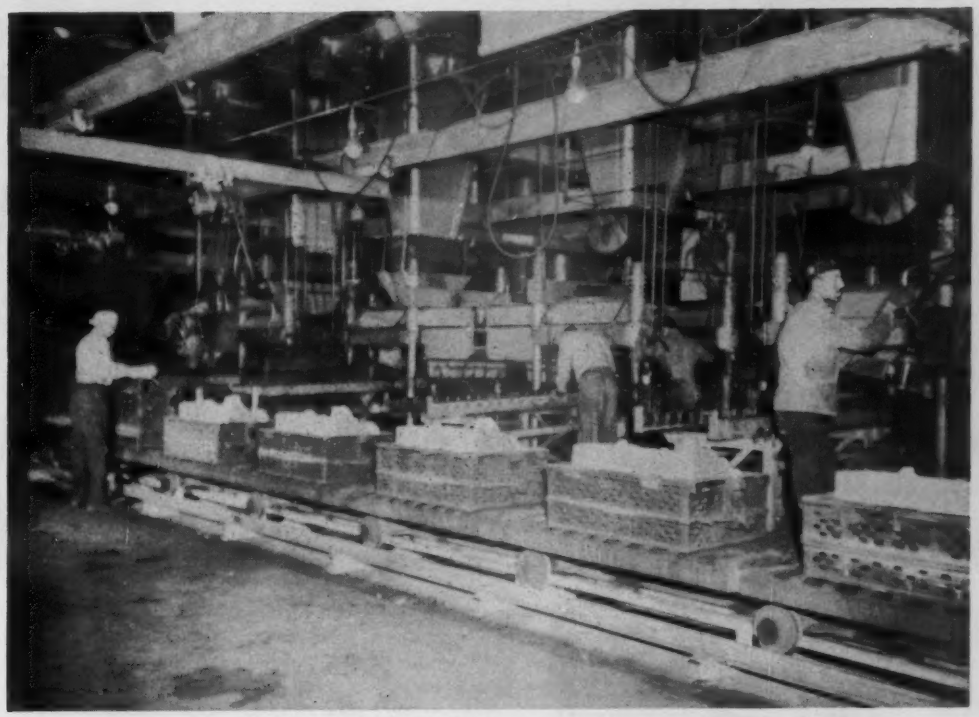
WHEELABRATOR
CORPORATION

505 South Byrkit Street Mishawaka, Indiana

Canadian Offices: Scarborough (Toronto) — Montreal

World's largest manufacturer of airless blast cleaning equipment and abrasives

For Half a Century MANUFACTURERS HAVE DEPENDED ON NICHOLLS for the Best in Molding Equipment!



A battery of NICHOLLS "push-button" automatic molding machines in a large foundry.

The Heavy Duty Molding Machines That Have Everything!

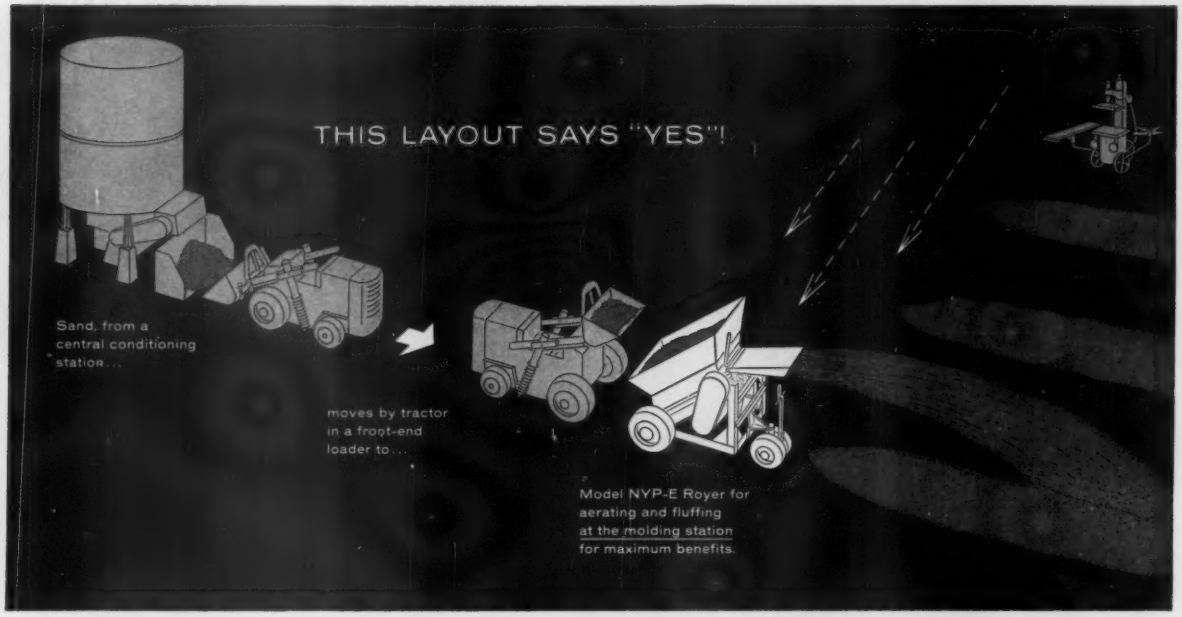
- ***"Push-button" automatic control to eliminate dangerous risks.***
- ***Precision-built for years of service.***
- ***Quality construction for finer molds continuously.***
- ***Fully automatic operation.***
- ***Greater molding economy than you've ever known.***

There must be a reason why so many of the country's top manufacturers choose Nicholls equipment. And there is. It's the same reason why *you* will want to specify Nicholls Jolt-Squeeze and Pattern Draw Molding Machines—Ease and economy of operation, low maintenance costs—and the best possible molds every time.

For complete information, write:
Wm. H. Nicholls Co., Inc., Richmond Hill 18, Long Island, New York.

NICHOLLS

ASK YOURSELF... "CAN WE GET BETTER SAND, AND A BETTER SYSTEM, WITH A ROYER?"


THIS LAYOUT SAYS "YES"!
Sand, from a central conditioning station...
moves by tractor in a front-end loader to...
Model NYP-E Royer for aerating and fluffing at the molding station for maximum benefits.

HERE'S HELP FOR YOU

Bulletin NY-54 for complete details and "specs" . . . an experienced Royer engineer to help you work out the system. Either or both for the asking.

Here is a positive cost-cutting sand conditioning system that falls within the budget limitations of the small or medium semi-mechanized foundry. It delivers better sand without adding to time or manpower requirements, and without the expense of complete mechanization. It gains the advantages of fluffing *after* handling, as the final step at the molding station.

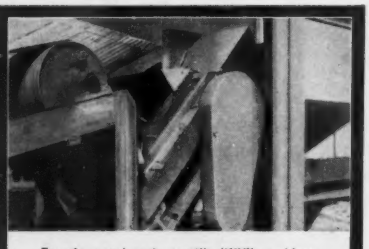
An integral part of this practical system is the Royer Model NYP-E Sand Separator and Blender. It can be moved swiftly from station to station, delivering cooled, aerated, fluffed, perfectly conditioned sand right where it's wanted. With it you can *really* get all the advantages of central system sand control.

Maybe your system "is different." There's a versatile unit of the Royer "NY" Series to fit it . . . and *improve* it. As the photos show, there are stationary models for easy installation at the discharge of a muller or in conveyor systems. But, however you use it, the Royer vastly improves sand, saves time and money, improves yield and quality of castings—all at a *fraction of a cent per ton of sand.*

Note the special literature offer. Write, wire or phone today.

Teamed with front-end loader, a Royer NYP-E Portable moves from floor to floor in a grey iron foundry. What used to be caked, packed sand from mulling, now is a cool, fluffy pile.

"NY" Stationary in a different role—taking direct 1800 lb. discharge of stiff sand from a 9 ft. muller in a steel foundry.



Foundrymen insert versatile "NY" machines into conveyor systems wherever convenient. Result—perfect sand . . . no time hold-up.

Foundry-wise agents throughout the U. S.

EXPORT DEPT.
10406 South Western Ave.
Chicago 43, Ill.

IN CANADA
Brown Engineering Corp.
15 Alcorn Ave., Toronto, Ont.

ROYER

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE STREET / KINGSTON, PENNA.

FOREMOST IN SAND CONDITIONING EQUIPMENT

STANDARD*ize*

...and rest assured!

You can lean back and relax when Standard's famous BLACKHAWK foundry sand is working for you. That's because you know you are using the finest silica you can possibly buy; that your foundry products will be top quality; that they will require less finishing, less clean-up time.

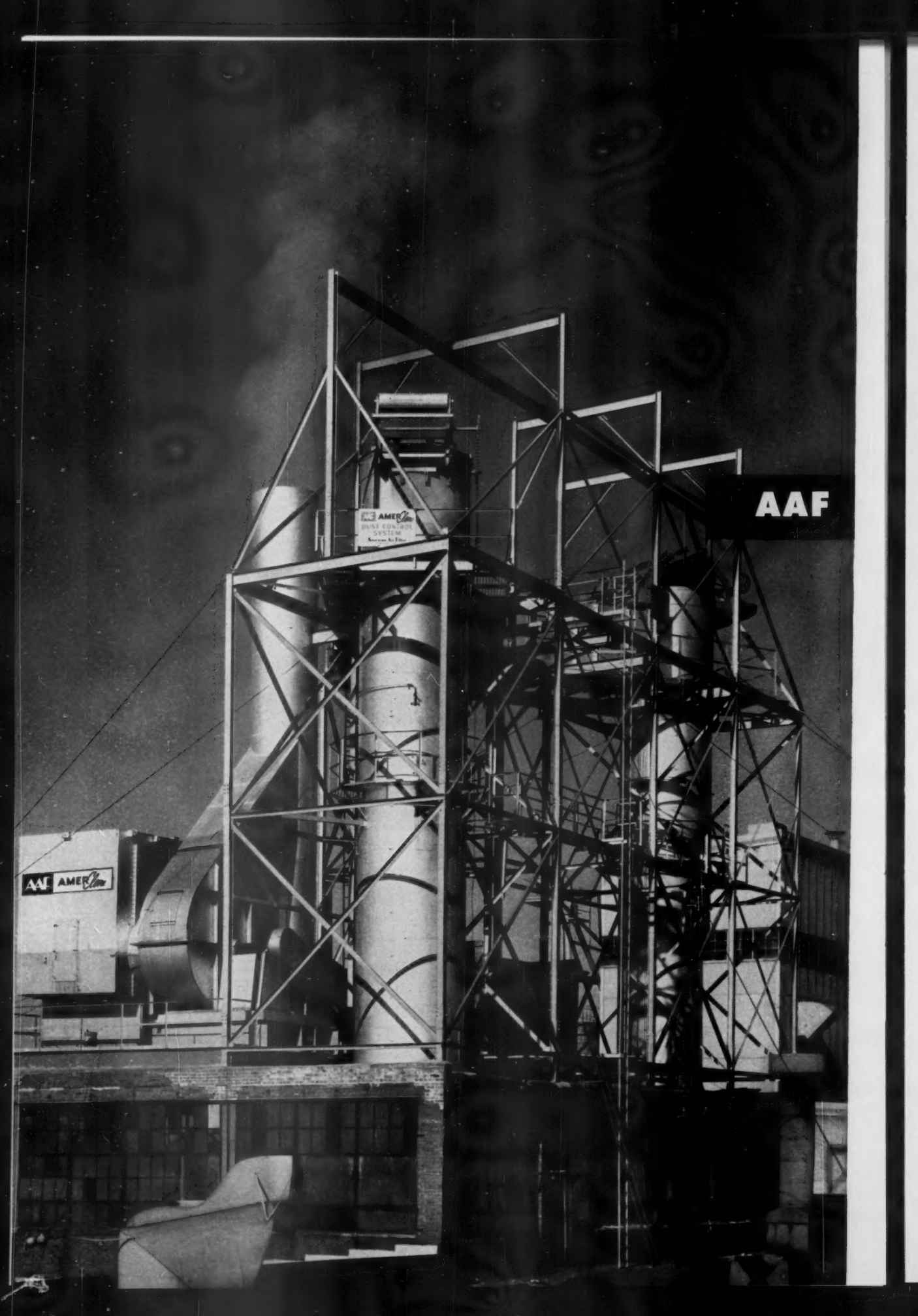
BLACKHAWK is the name, and the Standard distributor in your area is the man who can supply you.

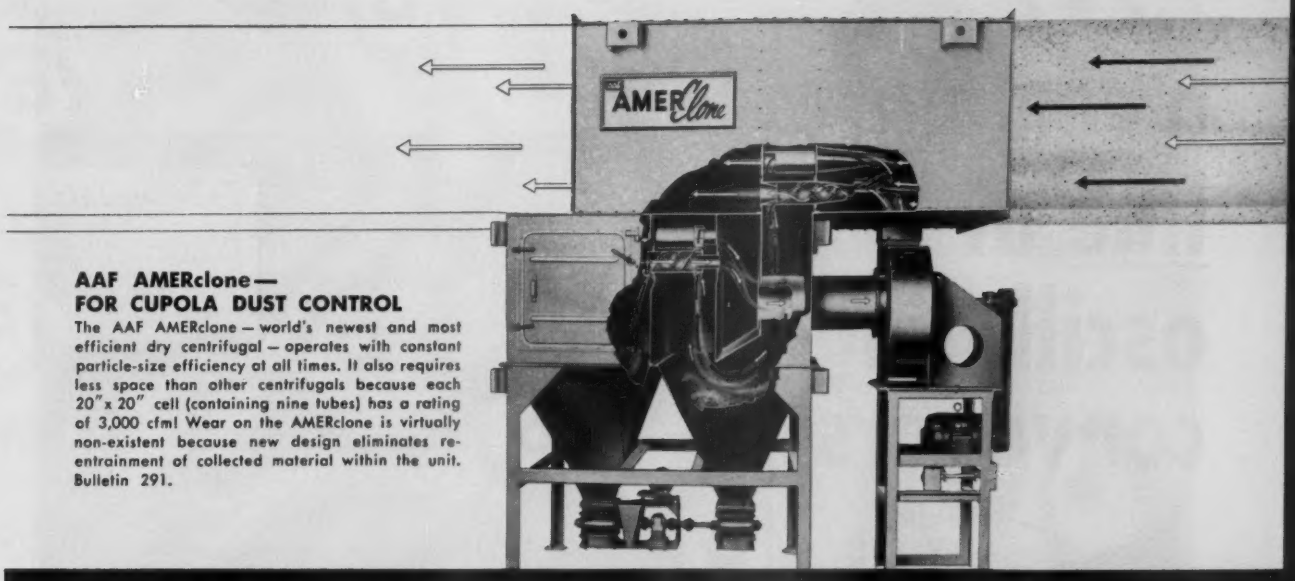
Shipping facilities via two of the nation's trunk line railroads.

STANDARD
Silica Company
OTTAWA • ILLINOIS

Silica Center of the World

Circle 587 on Page 51


AAF
AAF AMERAIRE
AMERAIRE
DUST CONTROL
SYSTEM



AAF AMERclone—
FOR CUPOLA DUST CONTROL

The AAF AMERclone — world's newest and most efficient dry centrifugal — operates with constant particle-size efficiency at all times. It also requires less space than other centrifugals because each 20" x 20" cell (containing nine tubes) has a rating of 3,000 cfm! Wear on the AMERclone is virtually non-existent because new design eliminates re-entrainment of collected material within the unit. Bulletin 291.

CONTROLS DUST AT GOLDEN FOUNDRY

- **AAF AMERclone collects 15 lbs. of dust per ton of melt in CUPOLA!**
- **TYPE N ROTO-CLONES keep SAND CONDITIONING SYSTEM dust-free!**
- **TYPE D ROTO-CLONES take the grime out of GRINDING!**

Golden Foundry, a gray iron foundry in Columbus, Indiana, is a good example of an alert, neighborhood-conscious foundry using the most modern methods for combatting dangerous dust.

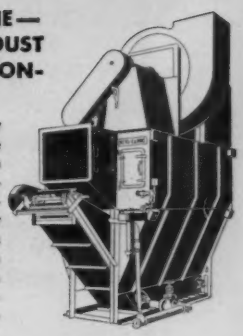
Golden's cupola system (including a No. 8 and a No. 10 cupola) is melting 17 tons of iron per hour. For every ton melted, the AAF AMERclone is removing 15 lbs. of dust! Here are the dividends:

- **Eliminates neighborhood complaints.**
- **Eliminates damage to cars in parking lot.**
- **Saves insurance rates.**
- **Increases visibility for workers on charging floor.**
- **Cuts foundry maintenance costs, especially roof maintenance.**

AMERclone serves two cupolas alternately, permitting full-time use of equipment. It is collecting fly ash, iron oxide, silica and other contaminants which otherwise would become an air pollution and maintenance problem. AMERclone traps the particles that cinder catchers miss . . . the *small* particles that create *big* problems.

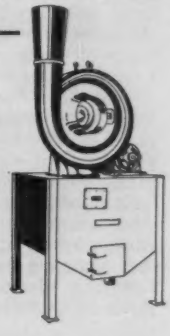
TYPE N ROTO-CLONE—
FOR CONTROL OF DUST ON SAND CONDITIONING SYSTEMS

The high cleaning efficiency of AAF's wet-collecting Type N ROTO-CLONE results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. There's no secondary dust problem with the Type N, and its compact design makes for important space savings. Bulletin 277.



TYPE D ROTO-CLONE—
FOR CONTROL OF GRINDING DUST

AAF's dry-collecting Type D draws in the dust-laden air, delivers the collected material to the storage hopper, and expels the clean air—all in a single operation with only one moving part: the impeller. Exhauster and separator are combined in a compact, self-contained unit. Bulletin 272.

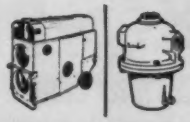


AAF herman nelson

American Air Filter

COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
American Air Filter of Canada, Ltd., Montreal, P. Q.

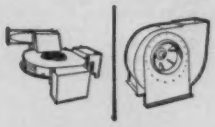
Herman Nelson Portable Heaters



Illinois Heating Specialties

— BETTER AIR IS OUR BUSINESS —

AAF Electric Furnace Hoods



AAF Type K Exhauster

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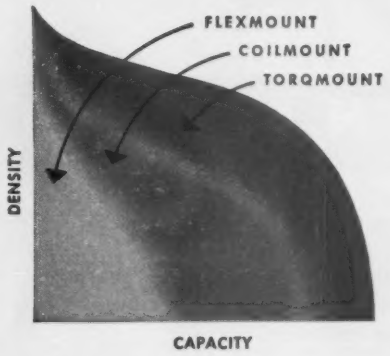
First time from any one source...

a complete line of oscillating conveyors



3 LINK-BELT designs cover all capacity/density requirements for low-cost conveying of all types of materials.

HERE's an example of how Link-Belt can match your sand and castings handling requirements with the right-capacity oscillating conveyor from industry's *only* complete line. All three installations at right were chosen to satisfy specific capacity demands. Each of these conveyors is all-metal, with a minimum of moving parts.

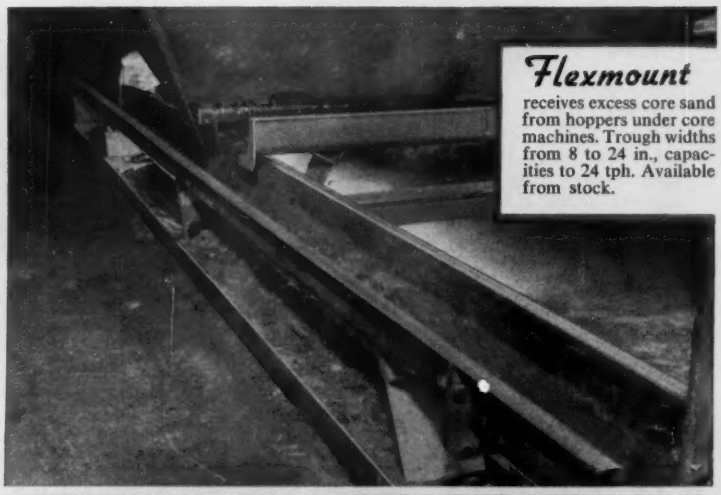
Link-Belt *Positive Action* controls the load at all times . . . assures continuous, uniform flow regardless of surges. It's supplemented by *natural frequency* which minimizes power requirements. For the best in light, medium or heavy-duty conveying, call your nearby Link-Belt office or authorized stock-carrying distributor. Or for facts on the complete line, write for Book 2444 featuring Flexmount and Torqmount, and Book 2644 covering Coilmount.

LINK-BELT

OSCILLATING CONVEYORS

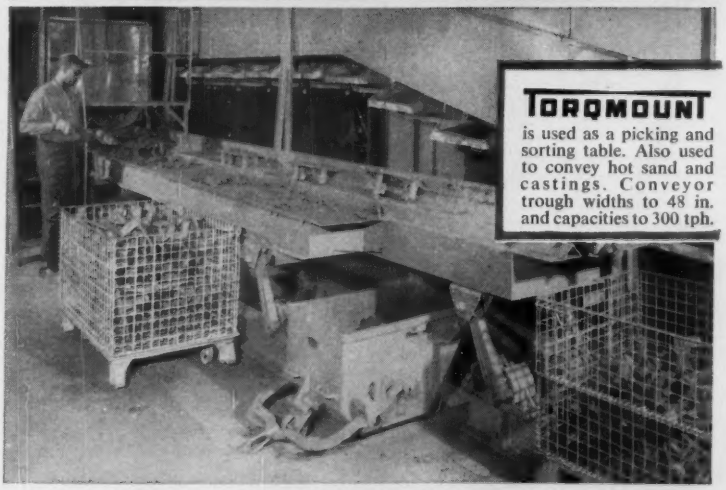
14,840

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.



Flexmount
receives excess core sand from hoppers under core machines. Trough widths from 8 to 24 in., capacities to 24 tph. Available from stock.

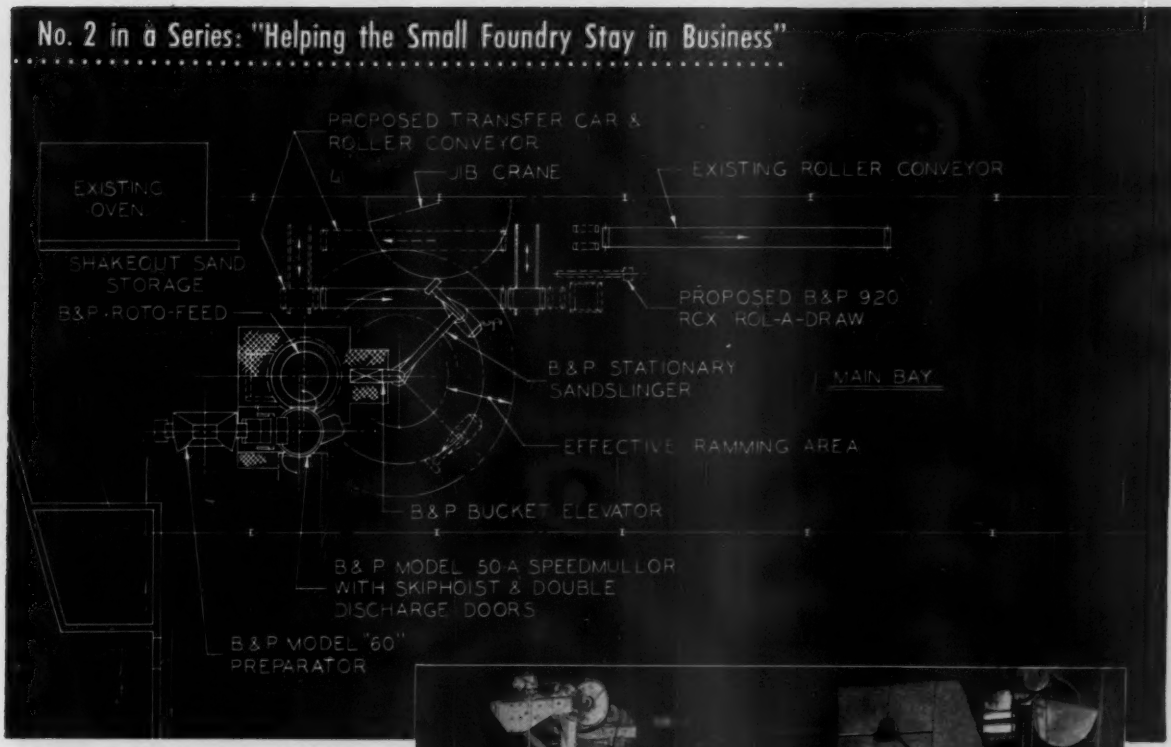
Coilmount
collects shakeout sand from shakeout — available in 10 or 20 in. trough widths, 6 in deep — capacities to 80 tph. Conveyors are stocked.



TORQMOUNT
is used as a picking and sorting table. Also used to convey hot sand and castings. Conveyor trough widths to 48 in. and capacities to 300 tph.

Circle 589 on Page 51

No. 2 in a Series: "Helping the Small Foundry Stay in Business"



Anstey's Key to Success!

PAY-AS-YOU-GO MECHANIZATION

The hard facts of small foundry operation brought Tom Anstey, the young owner of Anstey Foundry, Stevensville, Michigan, to these conclusions:

1. *His small foundry, started in 1945 with just twelve men, was being squeezed between a highly competitive casting market and the high costs of labor and material.*
2. *The only way to escape the squeeze was to raise production without raising costs, or to cut costs while maintaining production.*
3. *Mechanization offered the only answer and "Pay-as-you-go" mechanization was the only kind his small shop could afford.*

Tom Anstey found the solution in a 1-2-3 B & P mechanization program. Step 1—the installation of a Stationary Sandslinger in August, 1953. Step 2—a Model "50A" Speedmullor in August, 1955, and Step 3—a "60" Preparator in October, 1956.

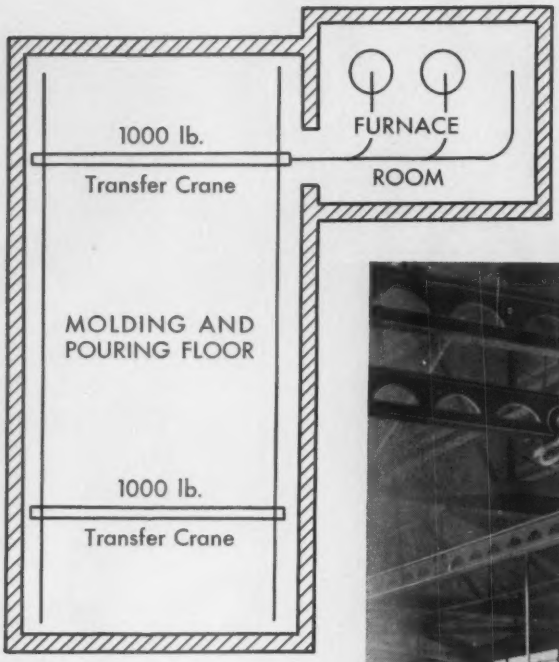
Each step completely paid for itself before the next step was undertaken. The results to date . . .

- ✓ *A 14% increase in production with costs actually reduced.*
- ✓ *47% of main molding bay crew released for other work.*
- ✓ *A one-man controlled sand operation replacing a four-man uncontrolled operation.*

Want more information? Write today. There's no obligation —we want to help. Beardsley & Piper, Div. Pettibone Mulliken Corporation, 2424 N. Cicero Ave., Chicago 39, Ill.

"Tramrail Cranes Lighten Load by 50%"

. . . declares foundry foreman



Hot metal is conveyed from furnaces to molds in fast time. Therefore, temperature drop is held to a minimum. Tramrail extended hand-wheel chain hoists permit lifts being made with the operator standing a safe distance from the molten metal.

A 240-LB. crucible for hand pouring, when full of hot metal, weighs with shank about 300 lbs. This is a heavy load for two or even three men to carry by hand and hold during the pouring of perhaps 20 to 40 molds.

At The Seagrave Corporation, Columbus, Ohio, manufacturer of fire-fighting apparatus, Cleveland Tramrail overhead materials handling equipment not only eliminates this hard work, but handles larger 750-lb. crucibles which speed production.

The Tramrail equipment consists of two transfer cranes over the molding and pouring floor and track and switch system in the furnace room. Either transfer crane can be interlocked with the track system to permit hot metal being delivered from furnaces to molds without rehandling.

The overhead equipment is also used for many other handling jobs such as moving flasks, sand, castings, etc. It reduces the time for this work and eases the burden on the foundrymen.

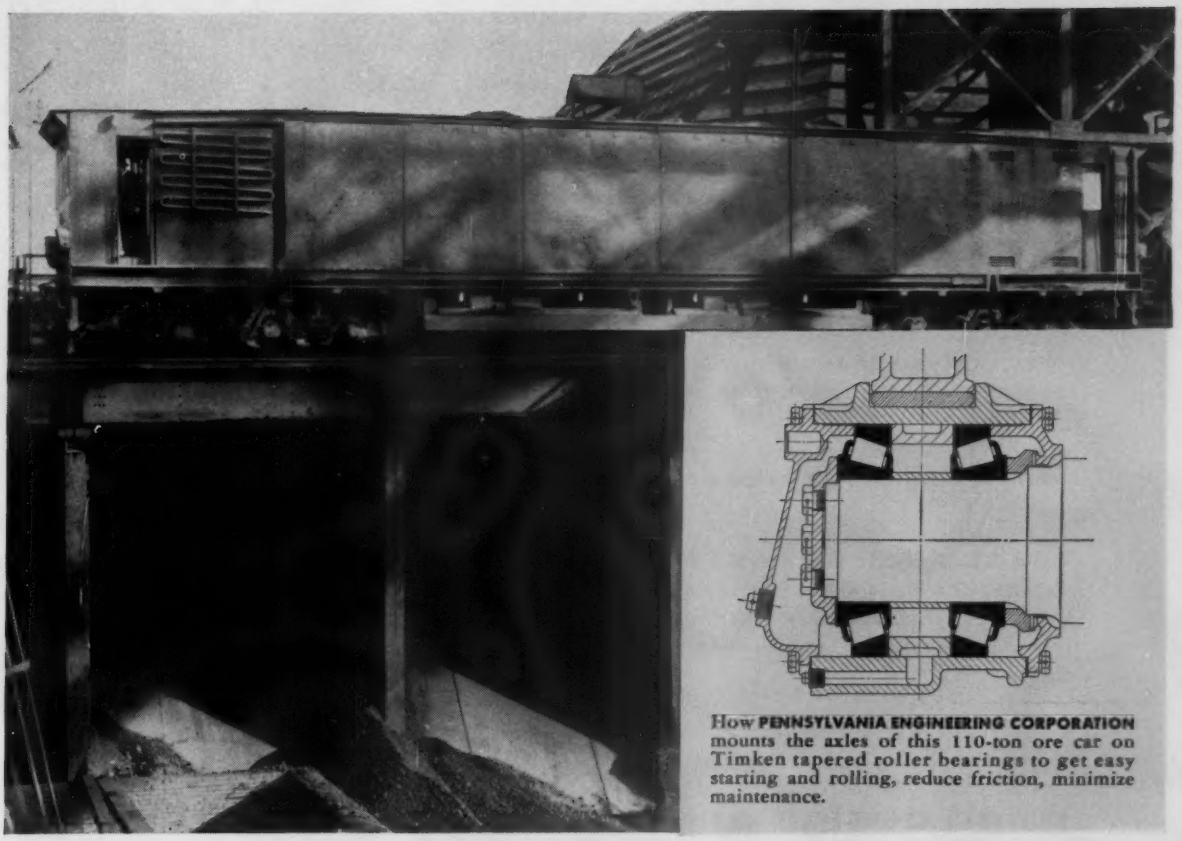
The foreman of the foundry declares, "These Tramrail cranes lighten the load by 50%. They are saving men's backs and making the work safer. Now the men don't take a lot of time off because of aches and burns."

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

Write for free booklet—2008.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3846 E. 286 ST. • WICKLIFFE, OHIO



How **PENNSYLVANIA ENGINEERING CORPORATION** mounts the axles of this 110-ton ore car on Timken tapered roller bearings to get easy starting and rolling, reduce friction, minimize maintenance.

New 110-ton ore car starts easier, rolls smoother and longer on Timken® bearings

BECAUSE this ore car carries a whopping 110-ton load, it has to be easy to start and keep rolling. It's a natural spot for Timken® tapered roller bearings. And it's no wonder that Pennsylvania Engineering Corporation used them on all 6 axles.

Because Timken bearings *roll* the load, starting resistance is cut up to 88%. There's no metal-to-metal sliding friction. Fully loaded cars start easier, with less power loss.

Geometrically designed and precision-made to roll true, Timken bearings virtually eliminate friction. Cars roll smoothly.

And Timken bearings take the tremendous weight and heavy shock loads. Their rollers and races are case-carburized to have hard, wear-resistant surfaces over tough, shock-resistant cores. Full line contact between rollers and races gives Timken bearings *extra* load-carrying capacity. Their taper lets Timken bearings take both radial and thrust loads in any combination. No costly extra thrust devices are needed. Bearing life is longer, maintenance is minimized.

What's more, by holding housings and shafts concentric, Timken bearings make closures more effective. Dirt and dust stay out. Lubricant stays in.

For all these advantages, specify bearings trade-marked "Timken" for the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

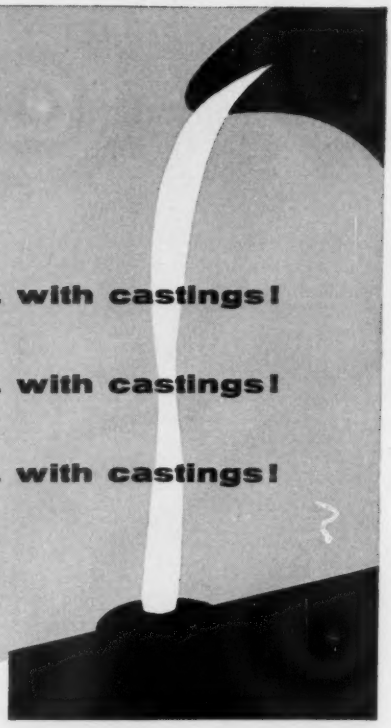
This symbol on a product means its bearings are the best

TIMKEN *TAPERED ROLLER BEARINGS ROLL THE LOAD*

TRADE-MARK REG. U. S. PAT. OFF.

Circle 592 on Page 51

castings are wonderful!



What is the only way to make large metal parts of complex shape economically? . . . . . with castings!

How can you make the most small parts at lowest cost—by the million, if you need to? . . . . . with castings!

What is the best way to make parts with smooth changes of stress flow? . . . . . with castings!

THESE ARE THE FACTS AGGRESSIVE FOUNDRYMEN ARE TELLING, individually and together, through their societies—in the grey iron, nonferrous, malleable and steel fields.

They add one more fact:

good design and consistent quality build more casting business

The buyer of castings requires only that his standards for reliable service be met.

THEORETICAL PERFECTION is needlessly wasteful to him . . . and costly to you.

we can help you make better castings—cheaper!

In scores of the best known foundries across the country Magnaflux Test Methods are now considered essential to reliable lowest cost casting production. If you are not now using them, we suggest especially that you investigate:

1. STRESSCOAT

The Magnaflux stress analysis tool that shows where high stresses occur—*during your design or pilot runs.* Shows whether stresses are detrimental or harmless. Leads to easy design correction.

2. MAGNAFLUX-MAGNAGLO

Magnaflux Magnetic Particle Inspection Methods that show *which* cracks or defects are significant and which are within the range of *safe* acceptance and good service. Test pilot castings also, for best set-up! ALSO: Magnaglo automatic for volume testing.

3. ZYGLO

Provides the same testing benefits for *nonferrous* casting control, pilot castings, etc. Starts as low as $125 with new ZA-43 Zyglo Kit shown here.

Also eddy current instruments to control hardness, heat-treat, etc., and sort mixed alloy lots.

When you use these MX test methods—*with assurance*—you can sell more castings, to more people—for more uses. This, of course, means bigger markets, for you, *from now on!*

For the evidence, ask any foundry that has adopted the "Magnaflux Plan of Casting Control." Or ask a Magnaflux Engineer to outline it to you.

THE HALLMARK OF QUALITY IN NONDESTRUCTIVE TEST SYSTEMS

MAGNAFLUX CORPORATION

7350 W. Lawrence Avenue
Chicago 31, Illinois

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 35 • Los Angeles 22

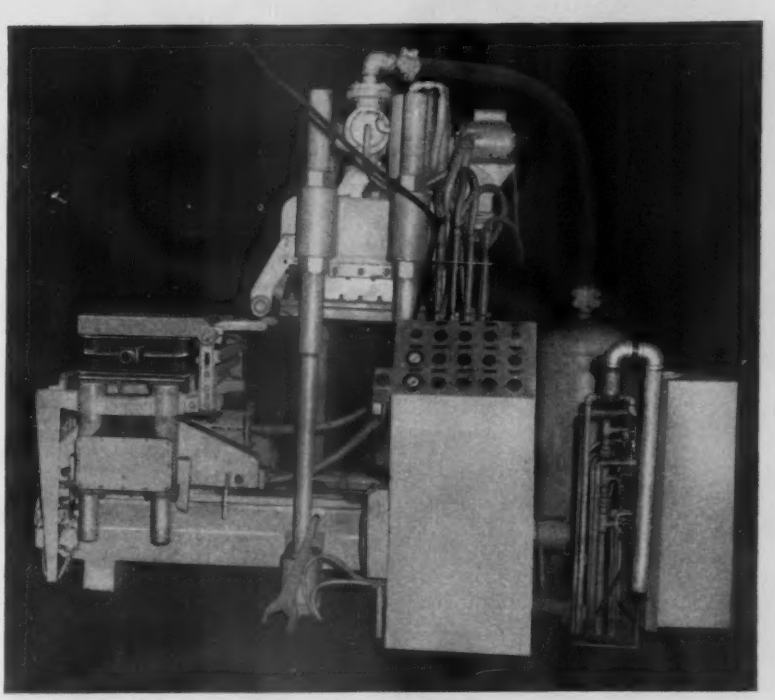
(Advertisement)

A REPORT TO FOUNDRIES

THE COMPLEAT MOLDING MACHINE

The title may be stretching the truth a little but not too much. It comes under the heading of what is known as "permissible advertising exaggeration." Actually, we are talking about a package unit built by Taccone which is ready to operate by plugging into a 110 volt circuit and air line.

We have had a lot of fun with this machine which we are using as a "travelling foundry show" to demonstrate high speed Taccone operations. The idea of a complete package including surge tanks, automatic controls, etc. would apply to any size Taccone Machine, but this particular one is a 16" x 20". We have it rigged with a valve-body pattern and a set of 16" x 20" flasks for running either with or without an upset strike-off device.



Just the other day, we got a letter asking what is the "outstanding single advantage of a Taccone diaphragm molding machine." Naturally, we hate to confine ourselves to any one advantage since there are so many. If there is a single one which is more outstanding than the others, it is illustrated by this valve-body pattern.

A vertical wall section such as the side of the brake drum or a half round section such as a valve-body is one of the toughest castings to make with precision. The difficulty is that most methods of molding this shape will create a ram-off condition. In the fitting industry, they usually refer to these ram-offs as shifts because they have all the appearances of a shift. Actually, they are typical ram-offs and exist when the sand is partially packed into position and then repacked by a later jolt or a later squeeze.

The diaphragm method, or contour molding as it is sometimes called, makes this defect impossible. The diaphragm literally wraps itself around the pattern and squeezes toward the pattern in every position. This is going much farther than could ever be achieved with a peen block or shaped squeeze-board since even those devices still squeeze downwards rather than sideways. The value of this elimination of ram-offs is well illustrated by one case in which it was possible to change from 8 fittings to a flask to 12 fittings per flask simply because, in previous practice, more than 8 pattern characters per flask would result in ram-offs.

This brings up the point of speed and the difference between apparent speed and real speed. For example, this particular machine illustrated has a completed cycle of 15 seconds. This means when it is hooked to a line it would provide 4 molds a minute. This in itself is pretty fast but is still not a full definition of "real" speed. It might be referred to as the apparent speed of the machine.

The real speed of the machine would come in when we recognize that, because of the elimination of ram-offs, in many cases it would be possible to produce 12 castings in this flask instead of 8. This means that a piece of equipment is capable of producing 48 castings a minute where a different operation would be confined to 32 castings.

One of the important features of a Taccone Machine is this ability to produce almost any size flask in the same length of time. Why bat your brains out trying to make a machine operate at 300 molds an hour if, by the simple expedient of putting four castings in a mold instead of one, you can slow down all of the equipment and still produce from 600 to 1000 castings an hour.

EASTERN CLAY PRODUCTS DEPT.
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
20 NORTH WACKER DRIVE, CHICAGO 6 • PHONE: Financial 6-1800

Actual photograph of valve gate casting from H-W FORSTERITE GRAINS shell mold. Casting is Type AISI-410 steel, manufactured by Fort Pitt Steel Castings Division, Pittsburgh Steel Foundry Corporation.

SMOOTH CAST SURFACES result from resin-bonded shell molds of H-W FORSTERITE GRAINS

Forsterite grain is highly refractory magnesium silicate possessing physical properties which make it especially suited for resin-bonded shell molding. Its specific heat, thermal conductivity, high temperature stability and uniform thermal expansion —all contribute to its excellent performance.

As the result of the optimum chilling effect of forsterite grain, sufficient strength develops in the skin of the steel casting to resist outside gas pressure as well as inside ferrostatic pressure, and a smooth casting surface is assured.

H-W FORSTERITE GRAINS are supplied in controlled sizings best suited for securing the most satisfactory shell molded casting surfaces.

H-W FORSTERITE FLOUR is furnished for use as an additive to the H-W FORSTERITE GRAINS and resin mix to provide for the ultimate in surface smoothness, particularly of castings with heavy sections. Write for bulletin No. 6.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Most Complete Refractories Service
GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

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February 1958

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
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535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
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654	669	684	699	714	729	744	759
655	670	685	700	715	730	745	760
761	776	791	806	821	836	851	866
762	777	792	807	822	837	852	867
763	778	793	808	823	838	853	868
764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

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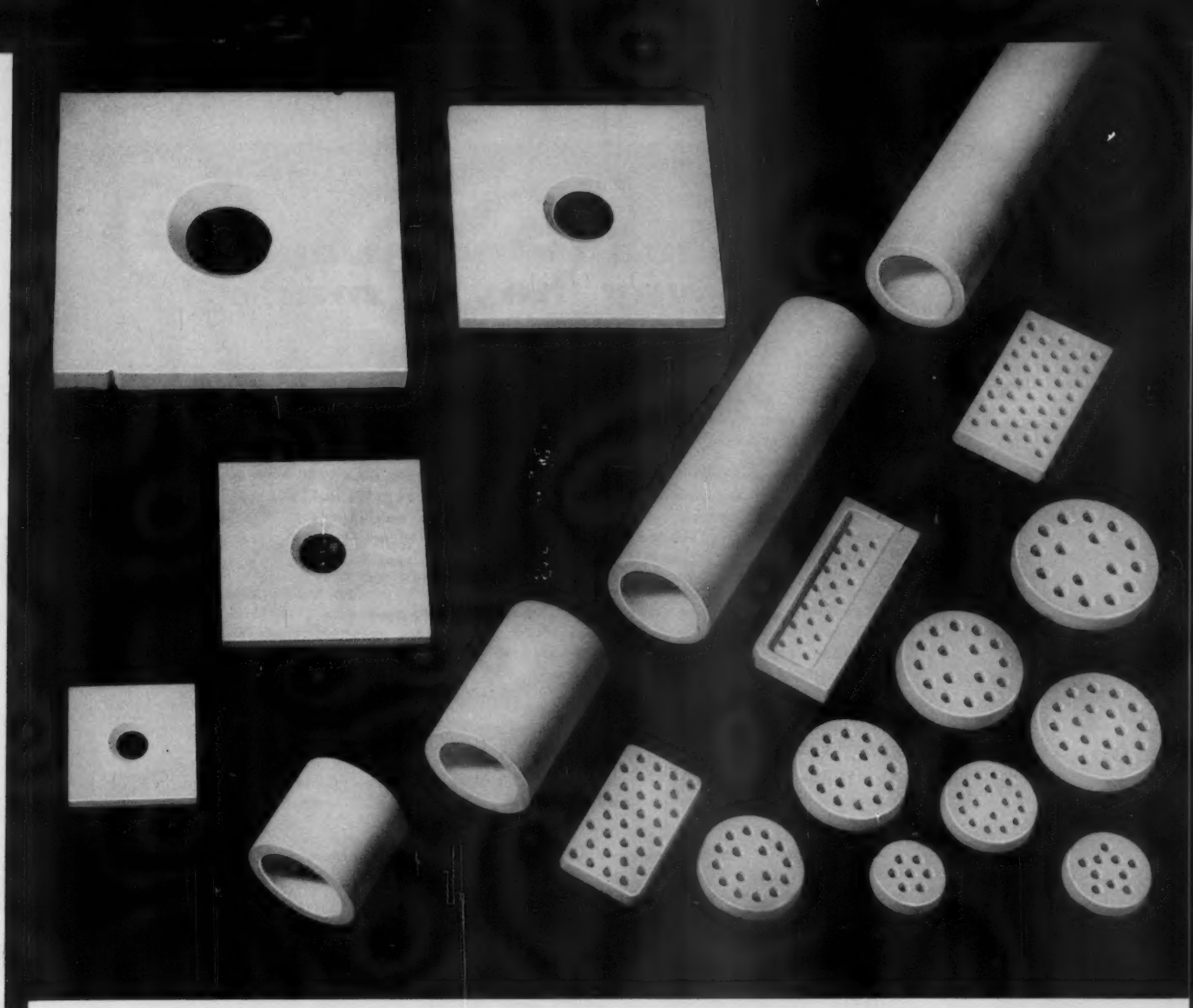


what do you need in **gating** and **risering** refractories?

To our customers in the foundry field this ad will come as *welcome news.* Louthan's line of production-proved refractories has been expanded to cover still more of your needs—help you save time and money on still more of your jobs.

Louthan Strainer Cores are now available in more sizes and shapes—and for *steel, iron, brass* and *bronze* castings. All provide an accurate choke for positive control of metal flow, eliminate slag and oxide inclusions.

Louthan Breaker Cores facilitate rapid removal of the riser with subsequent labor savings. There is no core gas. You get cleaner castings. Available for all riser diameters from 2″ to 12″, and for use with *any metal casting* risering from a flat surface.

Louthan Gate Tiles prevent erosion of the gates in steel castings. They safely withstand high temperatures, will not react with the molten metal. All popular diameters and lengths can be furnished.

So again we say, "What do *you* need?" *We have it!* If you haven't used Louthan Refractories, it will pay you to try them.

THE Louthan MANUFACTURING COMPANY

(A SUBSIDIARY OF FERRO CORPORATION) EAST LIVERPOOL, OHIO

REPRESENTATIVES: M. A. BELL COMPANY, St. Louis 2, Mo. . . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 46, Wisc. . . . **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . . Indianapolis 7, Ind. . . . Buffalo, N. Y.; **MISSOURI REFRACTORIES COMPANY,** 4599 Pacific Blvd., Los Angeles 58, California

Circle 596 on Page 51

they've made their way... by the way they're made

The application of Liaison Engineering is one part in the policies which further the meaning of this theme. A second important factor contributing to the high degree of quality and operating ability of a Herman Molding Machine is illustrated herewith.

It takes approximately 7 days to completely assemble the 40 x 124" Herman Rollover and Draw Machine and 40 x 124" Jolt Machine shown. We feel, however, that this complete assembly, and thorough testing, of all our machines is extremely important. It happens to each and every one of them before they leave our Zelienople, Pa., plant. It is our guarantee that they meet our customer's specifications.

Here are just a few of the tests we give our molding machines: The jolt machine is operated for a prescribed period of time, under simulated production conditions. Adjustments are made to guarantee peak efficiency. Vibrators, pneumatic clamping devices, various air valves, pressure reducing valves and other components, are carefully checked.

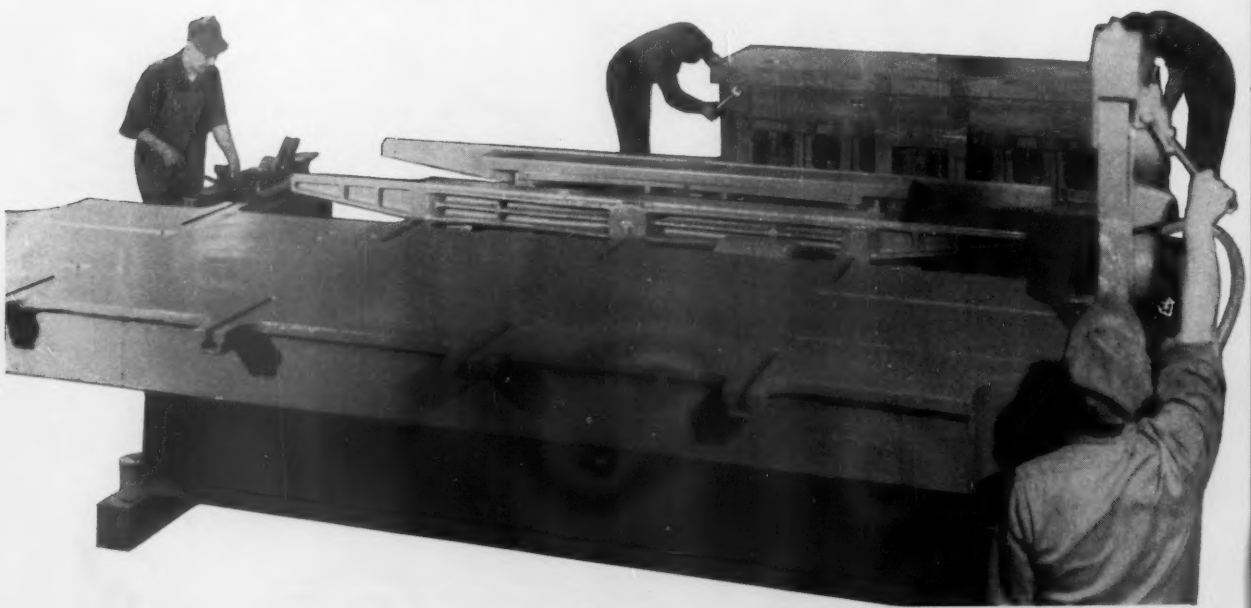
Multiple cycle testing is done on the draw mechanism, and the roll-over operation is checked and re-checked for proper speeds, to coincide with the requirements set forth by the user.

The entire units are then disassembled for shipment, crated, packed and skidded for safe, reliable transportation to all points throughout the U.S., Canada, and 30 foreign countries.

This type of careful, analytical checking of the finished Herman Molding Machine, then, is further proof not only to us, but to our customers, that our 11 different types Have Made Their Way By The Way They're Made.

Why not select the one to fit your plant today?

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.



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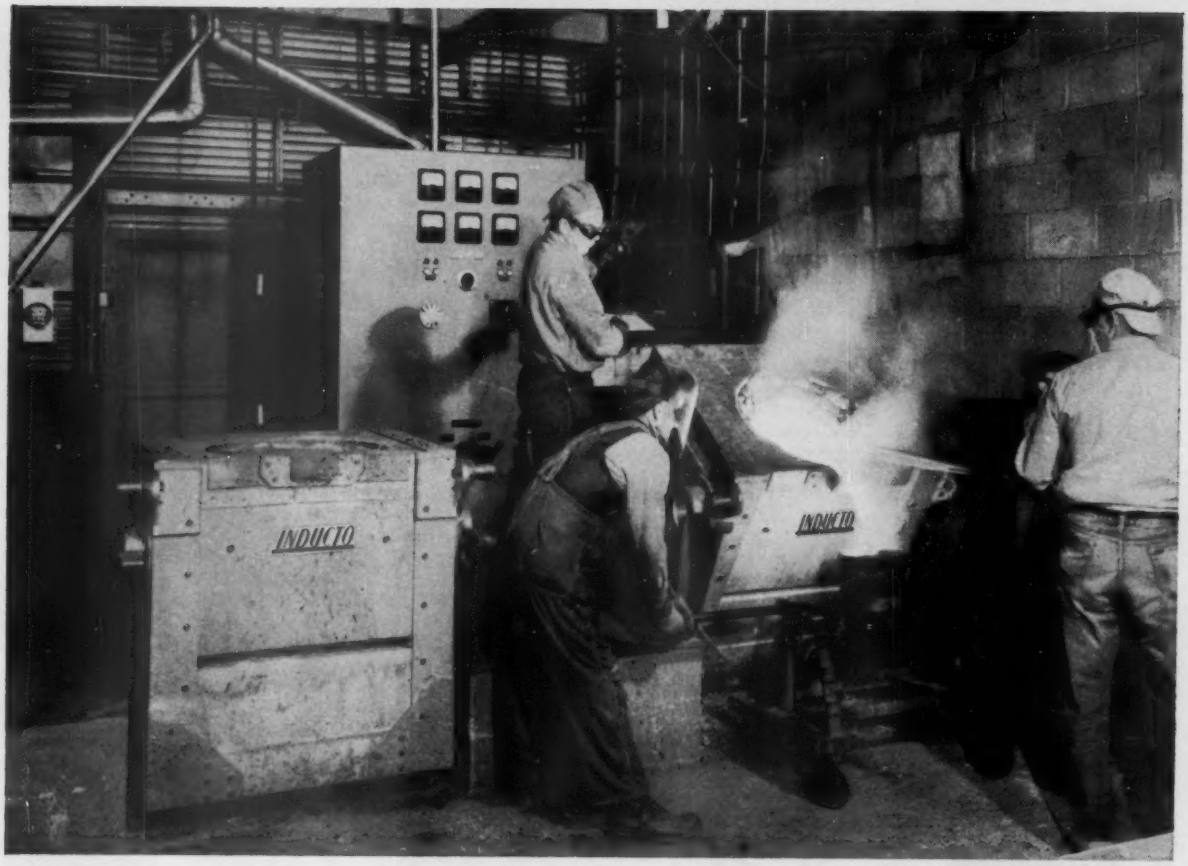
another Inducto installation...



Waukesha Cuts Rejects In Stainless Castings With Inducto Furnaces

Waukesha Foundry Company, Waukesha, Wisconsin, is a major producer of stainless steel castings with emphasis on parts for dairy and other food equipment. To minimize rejects, Waukesha has installed Inducto induction furnaces in its stainless foundry. If you are wondering how a furnace can cut rejects in castings, consider the following facts.

Inducto high-frequency induction furnaces with precision control provide a controllable analysis on alloys. Since the heat is generated in the metal itself, there is no excess or external heat to cause oxidation of some of the alloys. The electromagnetic stirring action of the induction furnace assures a uniform, homogenous alloy. Additionally, melt after melt can be exactly duplicated by the precise control of the Inducto equipment.

At Waukesha, two 650 lb. furnaces and an Inducto Push-Out furnace (not shown) are operated from a 175 KW m-g set and controlled from a single, compact control panel. The tilting furnaces are used for stainless castings while the Push-Out, a unique removable crucible furnace, is used for hard-to-melt non-ferrous alloys.

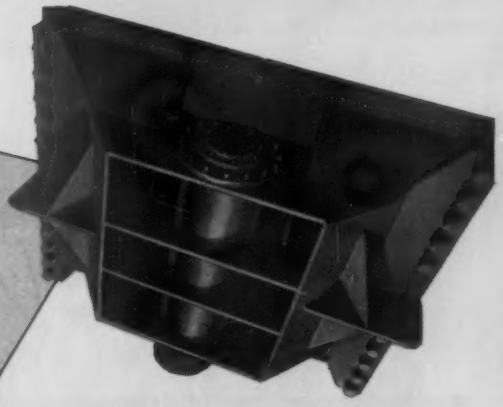
Design-wise, too, Inducto melting equipment offers many advantages. Learn how you can benefit from the use of the most modern melting equipment available today. Write to:

INDUCTOTHERM corporation

412 Illinois Avenue • Delanco, New Jersey

Circle 598 on Page 51

it's the
EXTRA WEIGHT
that
Slashes Knockout Time



"FOUNDROMATIC" SHAKEOUT

This view of the *Foundromatic* shakeout from below shows what we mean by heavy duty construction. Look at the sturdy deck supports and heavy tubular steel spacer, all welded integral with body and deck. Construction like this, of course, adds years to shakeout life, but more than that—it *provides the reserve weight* that assures rapid knockout of cores and shakeout of flasks. The *Foundromatic* shakeout weighs more than 40% of its rated capacity — and that's all the weight you'll ever need for a fast, clean operation.

For complete information, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin O7B6365B.

New Control Replaces Mechanical Snubbers... Assures Smooth Stop

Single control features two timers. When "stop" button is pressed, the first timer allows shakeout to coast down to one-third operating speed. This timer then energizes contactor which reverses current. This reversal of current through motor carries shakeout quickly through critical amplitude range. Stopping is smooth. Second timer shuts off current before motor can reverse direction of rotation. See Bulletin O7B8141.

Foundromatic is an Allis-Chalmers trademark.

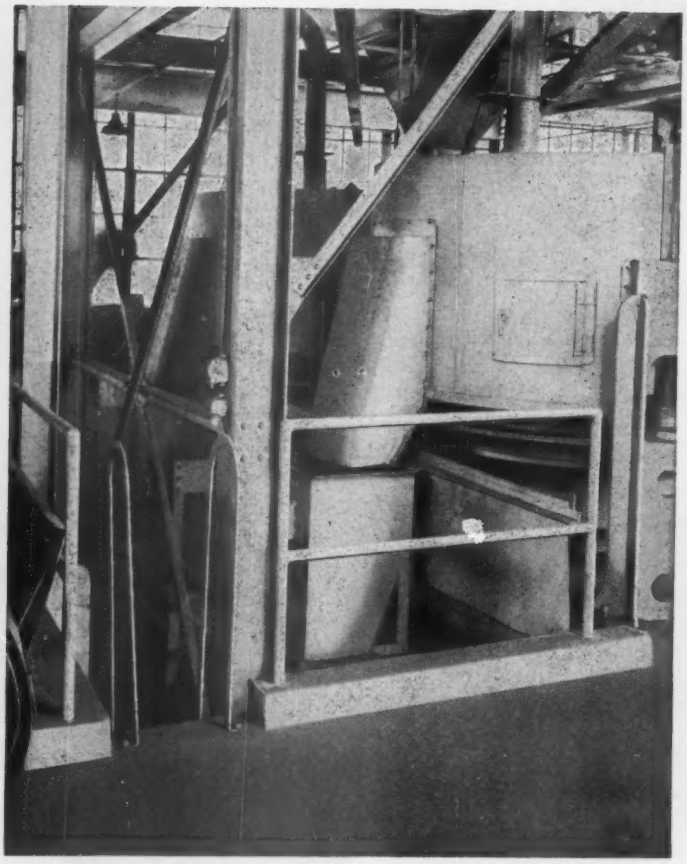
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5409

Circle 599 on Page 51

THE *Clearfield* MIXER



gives *consistent uniformity* in your sand

Automatic time controls on the Clearfield Mixer permit the use of a predetermined, uniform procedure without depending on the human element. This gives you precise control over length of tempering, quantity of bond, and all other factors—you don't have to mix sand by your operator's "instinct". The result is consistent uniformity . . . the Clearfield way. These controls may be added to any Clearfield Mixer.

Write today for Catalog No. 83. See what we mean by "A Clearfield Mixer for every need!"

CLEARFIELD MIXER mixes, tempers, aerates

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

Circle 600 on Page 51

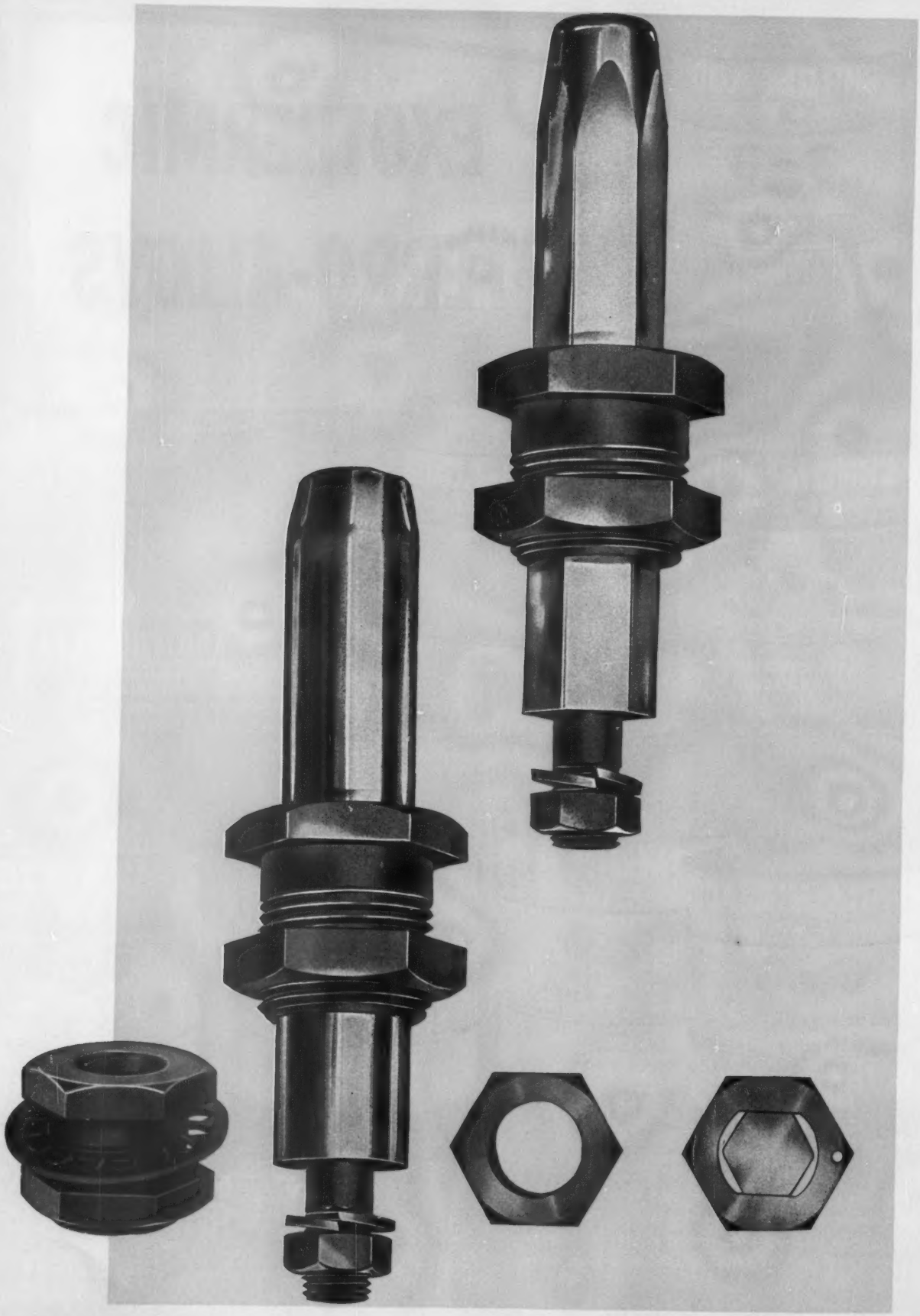
Circle 601 on Page 51→

For ladle additions to iron and steel we have a complete line of exothermic alloys. Their use, in place of conventional ferro-alloys, may offer substantial improvement in efficiency and alloy recovery.

Write for our brochure which tells how these products may benefit you.

QUALITY SERVICE DEPENDABILITY

Ohio Ferro-Alloys Corporation
Canton, Ohio



Here are FACTS about pins and bushings

1 Over 30 years ago, HINES *designed* and *produced* the *first* hard-chrome-plated and ground pins, and case-hardened, hard-chrome-plated and ground bushings.

2 Today, HINES is still the *only* producer of hard-chrome-plated pins and bushings.

3 Hard-chrome-plating of pins and bushings is the *only* successful way to prevent rust and "chattering", and insure a smooth, quick draw.

4 Perfect alignment of cope and drag is achieved *solely* by accurate machining of the flask *prior* to installation of pins and bushings. HINES flasks are machined for pins and bushings in a micrometer-adjusted jig, to guarantee perfect alignment of cope and drag.

5 HINES flasks can be equipped to your *exact* requirements, with single or double pins—round, hex or "V" type—with adjustable slides or bushings.

6 The best proof of the quality and efficiency of HINES pins and bushings, is the indisputable fact that more foundries use HINES than any other brand.

7 HINES, and only HINES, is the producer of HINES pins and bushings.

8 There's never been a satisfactory substitute for the best equipment!

THE HINES FLASK CO.

3431 WEST 140th STREET
CLEVELAND 11, OHIO

Circle 602 on Page 51

UNIFORM GRAIN STRUCTURE and smooth surface of shell mold for a fireplace cleanout door are examined by Don Smith, foundry foreman, and Lyman Pellett, plant superintendent, Bennett-Ireland, Inc.

Foundry cuts costs for customers with accurate shell mold castings

"Shell molding cuts costs for our customers—and for us," says the management of Bennett-Ireland, Inc., Norwich, N. Y.

This 50-year-old foundry took the step to shell molding after eight months of development work with Durez foundry resins.

Today, Bennett-Ireland keeps seven shell mold machines busy on parts for fireplace equipment, which they manufacture, and on castings for other firms. Bennett-Ireland still uses Durez resins exclusively.

50% saving on parts

For one customer, this foundry makes cutter and scraper blades for automatic ice-making machines. Formerly, the cutter blades were flame-cut from bar steel, then drilled. The scraper blades were produced by welding four pieces of bar steel, then machining a cutting lip.

Now Bennett-Ireland cuts this customer's parts cost in half. The accuracy of shell molding makes it possible to cast both blades, eliminating the cutting, drilling, and welding operations, and sharply reducing finishing time. The blades are cast of manganese bronze, improving corrosion resistance of the parts.

For another customer, Bennett-Ireland used to cast high-tension wire weights, using a two-impression jolt squeeze pattern in green sand. Now these grey iron castings are produced from a six-impression shell pattern, with obvious savings.

On Bennett-Ireland's own line of fireplace equipment, shell molding with Durez resins cuts the cost of andirons and other components, which formerly had to be purchased; helps produce fireplace parts with excellent detail and smooth surface requiring little finishing; and reduces parts inventory, since shell molds can be made and stored for use whenever needed.

Changeover takes time

If shell molding is in your future plans, remember that the changeover takes time and requires experience. This is where your Durez technical man can help you. He's well versed in shell molding and its application to foundry practice. He offers you a unique background of experience: a large percentage of shell molds in this country are made with Durez foundry resins.

For a better idea of the results foundrymen are getting with these resins, write us today asking to receive issues of fact-filled "Durez Shell Molding News."

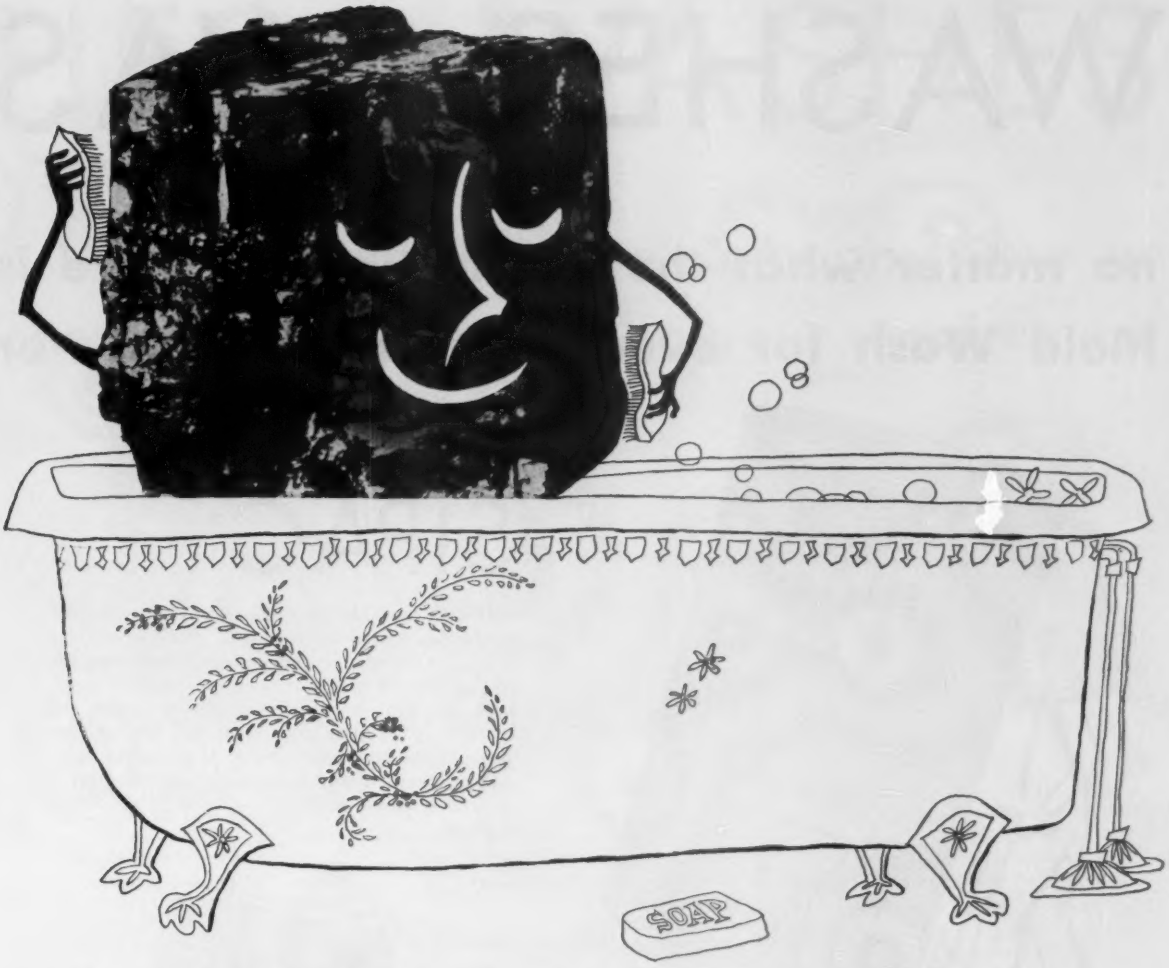
DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

1002 Walck Road, North Tonawanda, N. Y.

Circle 603 on Page 51



Only CLEAN, WASHED COALS are good enough for

NEVILLE FOUNDRY COKE

THERE'S a good reason why every ounce of coal is washed before it's used for making *Neville* Foundry Coke. Washing coal helps remove impurities such as ash. By using clean, washed coals—including a high percentage of low volatile Pocahontas—Pittsburgh is able to produce foundry coke that is denser, stronger, more uniform—with a higher percentage of fixed carbon.

And these are *exactly* the qualities you need in foundry coke to produce a hotter, cleaner, more fluid iron with a higher yield of quality castings.

We're *so* sure of the quality of *Neville* Foundry Coke that we guarantee it to meet your rigid specifications. We'd like to talk over *your* coke requirements. *Call or write today!*

Neville Pig Iron and Neville Coke for the Foundry Trade

WSW 6989

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

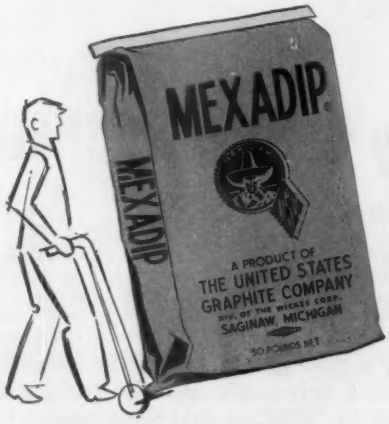
WASHES · WAS

no matter what the application . . . there is Mold Wash for every foundry need . . . or

SIPAC®

with only the addition of water, produces a bright, gold-colored coating with fine, smooth surfaces, using any foundry sand. It's non-carbonaceous and inert and will not react with any molten metal, including grey iron and steel. Resists flaking and completely protects core surfaces. You get improved casting quality. Sipac is available in 55 gallon drums, ready for mixing and dilution to desired Baume — even to a scale of 32 — without settling.

MEXICAN® VV FLAKE ("volatile vehicle") — meets the growing demand for good mold and core wash suited to carbon dioxide mold-core hardening process. Completely compatible with isopropyl alcohol, oleum spirits, kerosene or similar agents, Mexican VV Flake provides extra refractory protection . . . improves skin hardness . . . gives better casting quality. Comes in paste form, suitable for application by spraying or dipping.



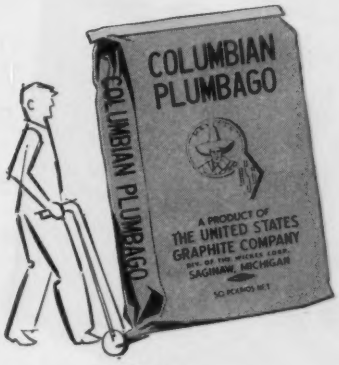
MEXADIP® — refractory core coating containing its own binder, requires only water to prepare it for use. Will not ferment, produces a very uniform, even coating over entire core with practically no sagging, running or dripping. Use it throughout foundry for green or baked cores, ferrous or nonferrous foundry practice.

THE UNITED STATES

GRAPHITAR® CARBON-GRAPHITE • **GRAMIX®** POWDERED METAL PARTS • **MEXICAN®** GRAPHITE PRODUCTS • **USG®** BRUSHES

HES · WASHES

a United States Graphite Company Core or one may be engineered to your requirement



MEXICAN® COLUMBIAN PLUMBAGO— versatile wet blacking used for loam work, green or dry sand or torch dried molds where soft coat with high resistance is required. Suitable for all types of castings, including those of over 25 tons, high steel mixtures and castings poured at high temperatures.

SLICK RITE® — compounded from a base of high quality flake graphite to produce best slicking qualities, Slick Rite is applied to green sand molds by hand rubbing, tooling or brushing. Excellent casting quality obtained when mixed with water and molasses to produce wet lead for spraying molds and cores.

MEXICAN® 172—high refractory wet blacking with binder. For application to both molds and cores of heavy sectioned castings where best possible finish is required under severe pouring conditions.

No. 866® — is a wet blacking without binder. Provides soft coating with good refractory properties for molds and cores of medium and light sectioned castings. Also makes good blacking for bell end cores in pressure pipe manufacture. Can be applied by spraying, brushing or swabbing at 40-45 Baume.

MEXICAN® 700 — is particularly suitable for large molds and dry sand cores of high carbon iron such as cast iron rolls and ingot mold castings poured at intermediate temperatures. Contains no binder.

Write today for engineering bulletin No. 17 giving complete details and application methods of core and mold washes for all ferrous and nonferrous foundries.

GF-244-2

GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

ADAMS ALUMINUM EASY-OFF FLASK

Built for You in Any Length, Width or Depth

Make real savings from these advantages!

RIGID CONSTRUCTION from our proven corner design, permits less weight with no loss of strength.

SOLID CORNERS are of the same design used on Adams Aluminum Slip Flasks. This interlocking tongue-and-groove construction is retained in perfect alignment with bolts secured through tapped end sections and locked with washers and nuts. Important! This construction has proved far superior to other forms of corner design.

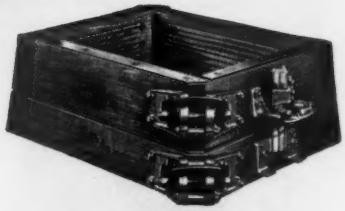
MALLEABLE TRIMMINGS are used on Adams Aluminum Easy-Off Flasks as on all other flasks we manufacture.

OPERATING MECHANISMS are identical with those used on the Adams Cherry Easy-Off Flask and incorporate the same simple adjustment and reversal of locking position.

STEEL PROTECTING STRIPS are standard equipment at top of cope and bottom of drag. Aluminum strips available upon request at no extra charge.

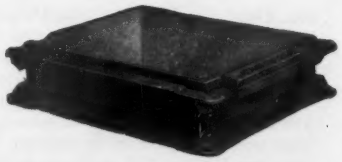
HANDLES AND TRUNNIONS are available when specified.

PIN AND EAR ARRANGEMENT available to interchange with present pattern plate guides.



Adams Cherry Easy-Off Flask

Adams Jackets, Cast Iron or Aluminum



Adams Steel Jacket

Write us today for further details . . . Cherry Snap Flasks—Cherry Slip Flasks—Aluminum Slip Flasks—Easy-Off Flasks—Cherry Presser Boards—Wood Bottom Boards—Steel Bottom Plates—Steel Jackets—Aluminum or Cast Iron Jackets—Steel Bands—Steel Upsets—Cherry or Aluminum Upsets

The ADAMS Company

Dubuque, Iowa

1883 75 years of progress 1958

Circle 606 on Page 51

THE NEW DEMMLER 70

A YEARS-AHEAD DESIGN BLOWS OR SHOOTS ANY TYPE CORES FROM OUNCES TO 10 POUNDS IN WOOD OR METAL BOXES

Latest Sleeve-Type Stationary Magazine: Slot design for most efficient operation; suitable for all core sand mixes.

Shoot Heads: Interchanged in seconds; no wrenches needed.

Quick-Change Blow Plate: Cam-operated clamps; no wrenches needed.

Horizontal Clamps: Quickly adjustable, horizontally and vertically without wrenches.

Fully-Enclosed Draw Mechanism: Six-inch accurate draw stroke.

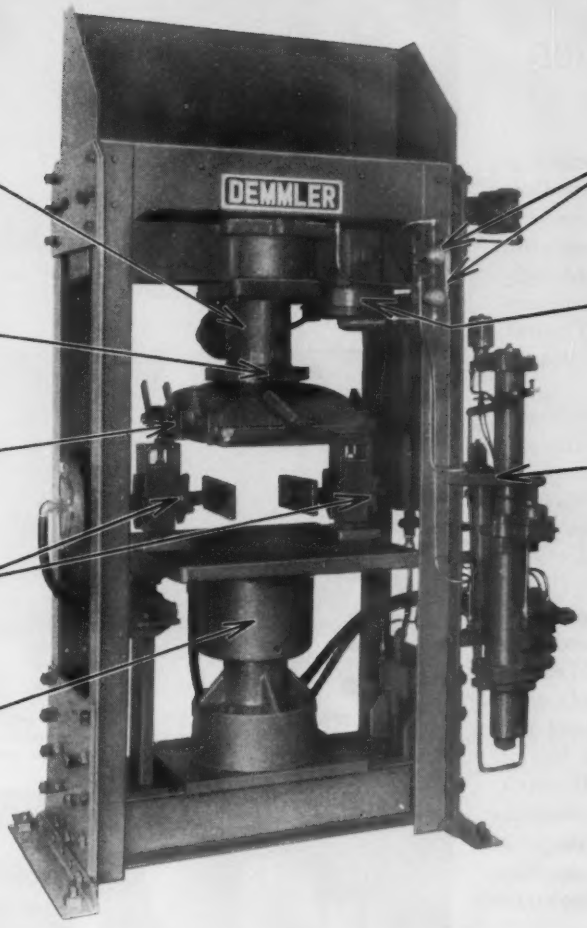


Table Height Adjustment: Push-button operated, eight-inch hydraulic adjustment.

Fast-Acting Large Size Diaphragm-Type Blow Valve: Easily replaceable diaphragms are the only wearing parts.

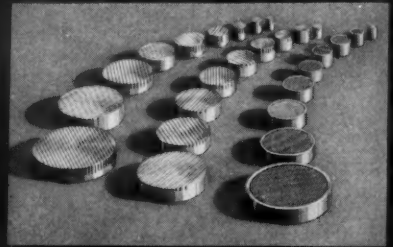
Automatic Sequence Control: One push of operating lever puts machine through a complete cycle.

Safety Controls: Machine is inoperative unless core box is properly located.

GET MORE FROM YOUR FOUNDRY DOLLAR

The new DEMMLER 70 is a low-cost, high-speed production machine, ruggedly constructed for heavy-duty use. Maximum versatility and ease of maintenance make this DEMMLER core blower a profitable addition for your foundry. Write us for more information. DEMMLER — since 1909 — the first name in core blowers.

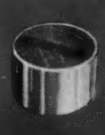
DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS



PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

Circle 607 on Page 51



HL 150 MESH VENTS

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

Large and intricate cores are cured in minutes with the

New Sodium Silicate-CO_2 Process

Elimination of oven baking speeds production ...cuts costs

Only a few minutes are required to cure green cores when the new sodium silicate-carbon dioxide process is used. Cores and molds are ready for the metal pouring line immediately after CO_2 curing. No time-consuming oven baking is required. The production cycle is faster . . . costs are lower.

In one foundry, six baking ovens were scrapped after the sodium silicate-CO_2 technique was given a trial. Another foundry reports that an overall cost saving of 21% has been achieved since switching from oven curing to the CO_2 process.

In addition, foundries using the new system find that CO_2-cured cores resist breakage, hot tears and cracks . . . can be made to extremely close tolerances. Foundry personnel like the new process because it has no toxic fumes or objectionable odors.

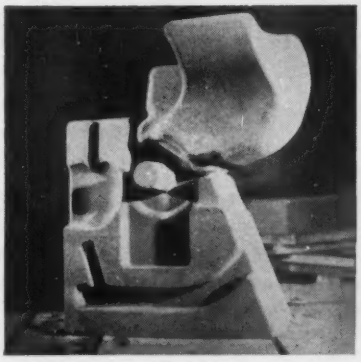
High-quality Du Pont sodium silicate is available in formulated products for CO_2 systems from foundry supply houses throughout the country.

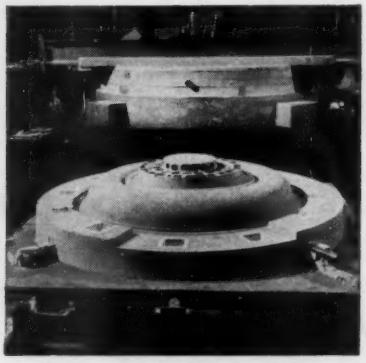
Binder formulations vary for specific needs and foundrymen prefer to rely on the advice of their foundry supply representatives for recommendations.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Grasselli Chemicals Department
Wilmington 98, Delaware

Fine core sand and a binder based on Du Pont sodium silicate are mixed thoroughly in a standard muller (left). Mixture is hand-tamped into form (right) then packed tightly with pneumatic rammer.

Core maker prepares to inject core with carbon dioxide (left). In the chemical reaction that results, the silicate is converted into a strong gel that binds sand grains together firmly. Cured core (right) is strong, yet will collapse easily after casting.





Intricate core for an automotive casting (left) is cured and ready for the metal pouring line in 2 to 3 minutes. Core for large industrial torque converter (right) is cured and ready for use in a few minutes. Oven curing would take several hours to do same job.

DU PONT
REG. U. S. PAT. OFF.

SODIUM SILICATE

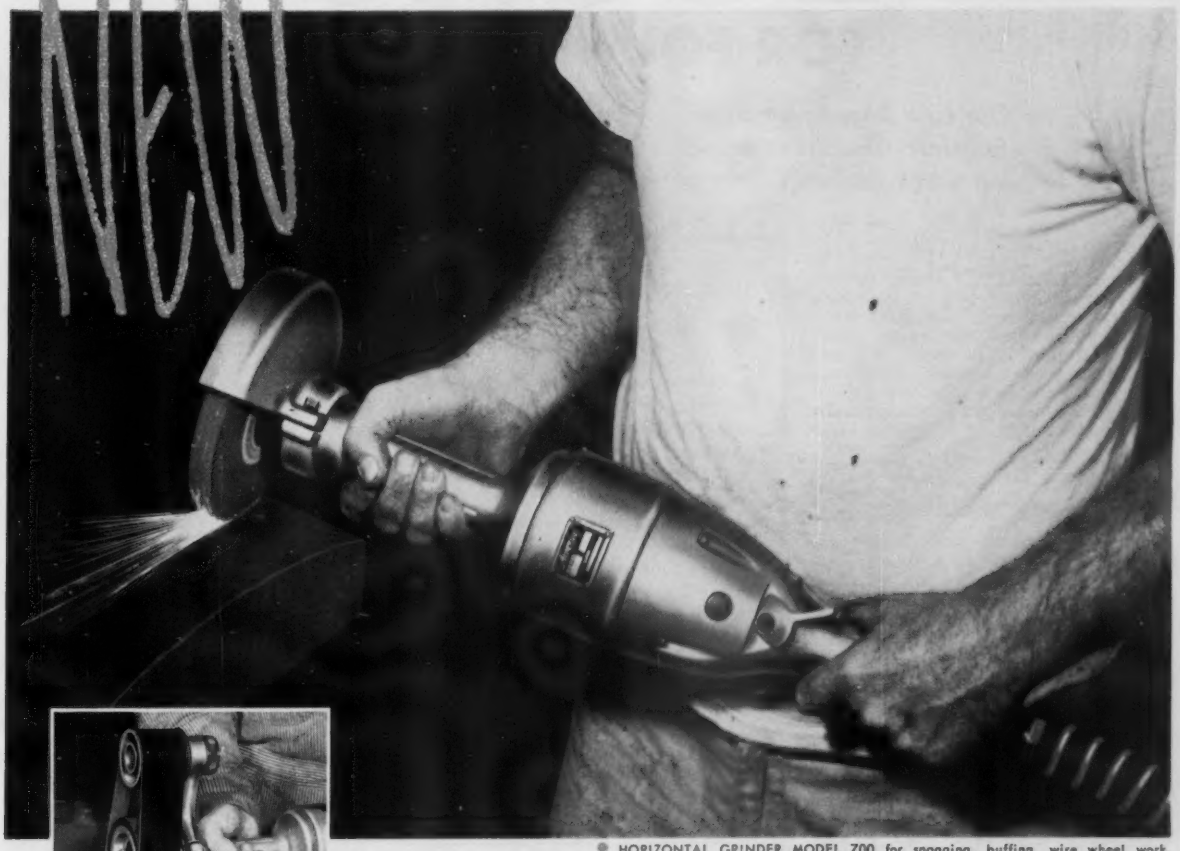
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Circle 608 on Page 51

AIRETOOL Pneumatic Grinders

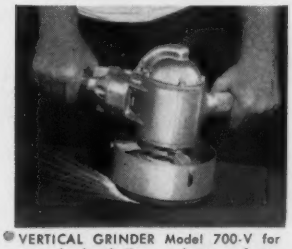
powerful . . . versatile . . . easy to handle . . . economical to operate

NEW



HORIZONTAL GRINDER MODEL 700 for snagging, buffing, wire wheel work. Balanced design, easy to maneuver, weighs only 12 lbs. Wheel capacity: 6" - 8", RPM: 4500-6000, Model 600: 2½" - 6" Wheel, 9000 RPM, weighs 9 lbs.

ABRASIVE BELT ATTACHMENT for fine finishing operations on flat or contour surfaces.



VERTICAL GRINDER Model 700-V for cup wheel grinding on large surfaces, wire wheel work or flexible disc finish work. Wheel capacity 6", RPM 4500-6000, weight 11 lbs.

MIDGET DIE GRINDER Model 200 — Precision tool for intricate grinding, filing and cutting. Speed 60,000 RPM. Collet Chuck ⅛" capacity.

Airetool's new line of portable pneumatic equipment is designed for increased production, less operator fatigue and lower operating costs.

All tools are powered by Airetool's dependable pneumatic motor . . . the result of more than 27 years' experience in designing, developing and manufacturing pneumatic powered equipment. Airetool motors are smooth running . . . powerful . . . can handle the heaviest loads without stalling or heating up.

Operating parts are precision made from hardened alloy steel and an effective lubrication system prevents wear, increases motor service life.

Write for the new Airetool catalog No. 63 showing the complete line of Airetool grinders, sanders, drills and accessories

New Airetool Catalog of Pneumatic Production Equipment

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge.
REPRESENTATIVES in principal cities of U. S., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario

BOOKS
FOR FOUNDRYMEN

Our Book Department carries a wide variety of books of particular interest to foundrymen. Here are some titles presently available. If you are seeking a title not listed, write us—we'll be glad to get it for you.

PRINCIPLES OF METAL CASTING

By Richard Heine and Philip Rosenthal. Covers every step of standard foundry processes . . . explains what equipment is used for each phase, when and how it is used . . . and describes proven procedures that make for greater economy in metal casting. Crammed with photographs and illustrations. —$7.50

ALLOY CAST IRON HANDBOOK

Contains practical knowledge advanced by outstanding authorities on production and application of alloy cast irons. Explains how to add alloys to secure greatest possible effect from their use. —$4.50

THE CUPOLA AND ITS OPERATION

Latest developments, such as hot blast, basic lining for nodular iron, and emission control are covered. Chapters such as those on refractories, principles of combustion, and metallurgy have been greatly augmented or are presented for the first time. More than 50 of the country's outstanding foundrymen have contributed their knowledge and experience to this book. —$9.50

AMERICAN MALLEABLE IRON HANDBOOK

Authoritative and complete, this handbook on malleable iron is published by the Malleable Founders' Society. —$4.50

STEEL FOUNDRY PRACTICE

By John Howe Hall

A new comprehensive sourcebook covering all phases of modern steel foundry practice. Contains practical information on almost every production problem steel foundrymen encounter. The easy-to-read text accompanied by over 250 detailed charts, drawings and illustrations of the "how-to-do-it" type. This volume represents the last of the many contributions which the late John Howe Hall made to the progress of the foundry industry.

496 pages, 252 charts and illustrations 6" x 9" cloth bound—Price $12.00.

FUNDAMENTALS IN THE PRODUCTION AND DESIGN OF CASTINGS

By C. T. Marek. Stresses the fact that economy of production is a basic requisite of good casting design. Techniques, skills and practices in casting production are developed to support the principal objective—correlating casting design with economical production. —$5.25

NONFERROUS FOUNDRY METALLURGY

By A. J. Murphy. Covers general principles unifying foundry techniques of all industrial nonferrous metals in relation to metals in the liquid state, to the process of solidification and to the factors influencing properties of casting. 497 pages. —$12.50

METALLURGY OF STEEL CASTINGS

By Charles W. Briggs. A comprehensive work. Provides complete information on methods of technical and industrial control in production of steel castings and describes every manufacturing process used. —$11.00

FOUNDRY CORE PRACTICE

Over 100 leading authorities on foundry problems collaborated with the author, Harry W. Dietert, to pool their knowledge in making this the type of book that is of maximum benefit to the foundry field. —$10.00

METALLURGY FOR ENGINEERS

By J. Wulff, H. F. Taylor and A. J. Shaler. This book is written from the metallurgical rather than the shop point of view and aims to give the reader "an adequate understanding of metals so that he may intelligently select and use them." 624 pages, 290 illus. —$7.25

BASIC COST PRINCIPLES FOR NONFERROUS FOUNDRIES

An up-to-the-minute guide for costing in both small and large foundries. Prepared by practical foundrymen, book is based on 10 years' research and experience under Government pricing regulations. —$5.00

FOUNDRY, BOOK DEPT., 1213 W. 3rd St., Cleveland 13, Ohio

Please send (postpaid) the following books I have checked:

- ☐ Principles of Metal Castings
- ☐ Alloy Cast Iron Handbook
- ☐ Cupola and Its Operation
- ☐ American Malleable Iron Handbook
- ☐ Fundamentals in the Production and Design of Castings
- ☐ Nonferrous Foundry Metallurgy
- ☐ Metallurgy of Steel Castings
- ☐ Steel Foundry Practice
- ☐ Foundry Core Practice
- ☐ Basic Cost Principles for Nonferrous Foundries
- ☐ Metallurgy For Engineers

NAME _____

ADDRESS _____

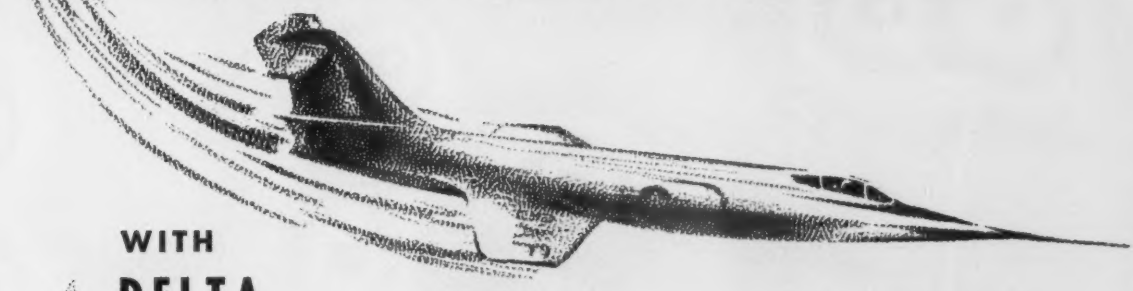
CITY AND STATE _____

Enclosed is $_____. ☐ Company Order ☐ Money Order ☐ Check

Orders for delivery in Ohio—add 3% to cover state sales tax.

COVER GREATER SURFACE AREA ...AND GET SMOOTHER...

CLEANER CASTINGS... *at lower cost!*



WITH

DELTA SUPERKOAT WASH

FOR ALL TYPES OF METALS

Delta SuperKoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked core surfaces by dipping, swabbing, spraying or brushing.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION & EXCELLENT ADHESION —** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-ON —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface area at a lower cost per pound of wash.

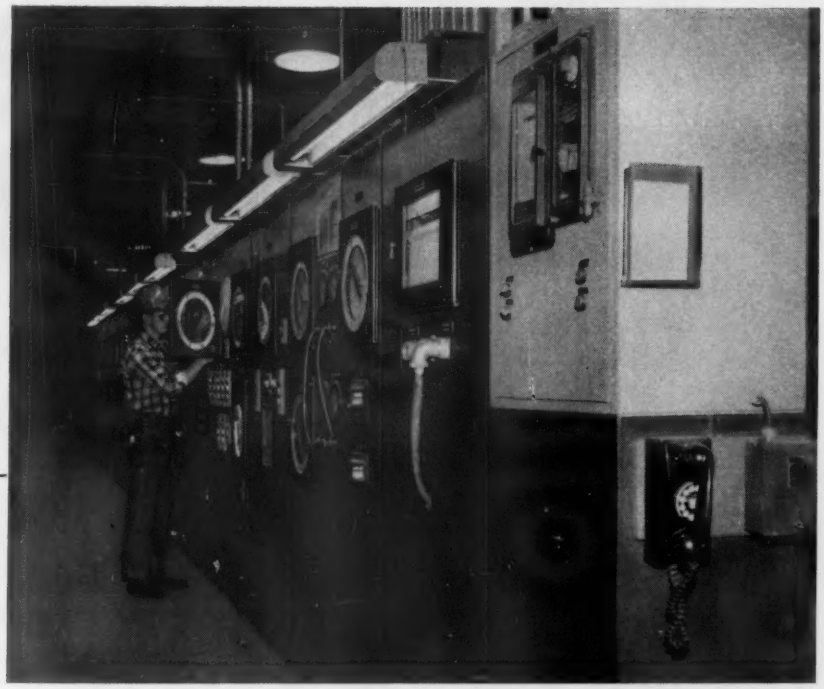
DELTA

DELTA OIL PRODUCTS CORP.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Circle 657 on Page 51



One of three cupola control panels contains *ElectroniK* controllers for two cupolas and a heat exchanger.

Honeywell controls aid in production of 3500 engine castings a day at new engine foundry

The new foundry of one of America's leading auto manufacturers has set a fast pace in the production of 6 and 8-cylinder engine castings.

In three phases of foundry operation—sand drying, core drying and cupola operation—Honeywell recording and controlling instruments help keep production humming.

This modern instrumentation complements the most up-to-date equipment for fast handling of materials. Overhead and floor conveyors speed movement of cores, molds and castings. Molten iron from cupolas is transferred in ladles carried in electrically-driven, cab-type cranes suspended from overhead monorails.

Here, as in many other types of foundry operation, Honeywell instrumentation pays for itself in terms of production, efficiency and quality. Your nearby Honeywell field engineer can help you gain these benefits in your own plant. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

H HONEYWELL *First in Controls*

Pangborn Blast Cleaning Cabinet

blast cleans 40 to 50 tons per day at General Metals foundry

The big $5 million foundry at General Metals Corp. in Oakland, Calif., boasts the latest, most efficient equipment for producing castings—from the molding to the finished piece.

Speeding production in the blast cleaning department is the Pangborn Monorail Cabinet shown above and two other Pangborn machines. This cabinet has handled as many as 3,500 large, individual castings a day—such miscellaneous pieces as brake drums, fuel injector pumps, valve housings, truck hubs, etc.—and cleans between 80,000 and 100,000 pounds of castings per 8-hour shift!

Thanks to Pangborn Rotoblast® cleaning action, Pangborn machines are speeding production in foundries throughout the country. That's because they clean quickly and thoroughly. They require less maintenance, less manpower. The result is *lowest cost per ton of castings cleaned*. Find out what Rotoblast can do for you. Write for Bulletin 227 to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

Pangborn blast cleans cheaper

Circle 612 on Page 51

Readers' Comment

It Takes Both

TO THE EDITORS:

It's been some time since I personally have had reason to correspond with you, but I just have to tell you that I think your editorial in the November issue, "It Takes Both," is terrific.

There has been a tremendous amount of talking and writing lately on the "marketing concept." So much talk that I think the term is not thoroughly understood by some and that others do not really appreciate the importance of the term.

I have succeeded in defining it for our use here at ESCO. It follows the thinking in your editorial so closely that I feel certain you will enjoy reading our definition, as follows:

Marketing: In its broadest sense marketing means doing business—producing and selling a product for a profit. *It is the entire business, seen from the customer's point of view.* The market man or department should be introduced at the beginning rather than the end of the production cycle. Marketing should be integrated into each phase of the business. Marketing, through study and research, will establish for the engineer, the designer and the manufacturing man *what the customer wants in a given product, what price he is willing to pay and where and when it will be wanted.*

Innovation: But there is more to doing business than marketing. Innovation is also needed before a "business enterprise" is created. It it not enough to provide the product —a business enterprise must provide better, more economical products. Innovation also goes right through all phases of business. It may be innovation in design, in product, even in marketing techniques.

Marketing and innovation are locked together in a business enterprise. What the business enterprise thinks it is producing is not important. *What the customer thinks he is buying is decisive.*

DAR G. JOHNSON JR.
Manager, Advertising Department
Electric Steel Foundry Co.
2141 N. W. 25th Ave.
Portland 10, *Oreg.*

•

TO THE EDITORS:

We wish to compliment you on the excellent editorial which appeared in the November issue of FOUNDRY. As you may know, we ordered enough copies to mail to all of our members and prospective members from coast to coast.

This editorial is a sober follow-up to the outstanding series of marketing articles which appeared in your May edition. Now that our own marketing program has been under way for a full year, we wonder how much it actually is costing foundries who do not take advantage of their trade association marketing and product development activities. Your editorial certainly emphasizes our convictions in this regard.

DONALD H. WORKMAN
Executive Vice President
Gray Iron Founders' Society, Inc.
National City - E. 6th Bldg.
Cleveland 14, *Ohio*

•

TO THE EDITORS:

Your editorial "It Takes Both" in the November, 1957 issue of FOUNDRY is very good and indeed thought provoking. We would like to obtain 15 copies or tearsheets of the above article.

ROBERT LANGSENKAMP
President
The Langsenkamp-Wheeler Brass Works Inc.
1234 Shelby St.
Indianapolis 3, *Ind.*

Who Can Make It?

TO THE EDITORS:

We are interested in locating a source for a counter bracket similar to the type used to hold plate glass on display counters. If possible, and

our reason for writing you, is to locate a source that would have existing pattern equipment and designs available as a stock or shelf item, since this particular part will be used on a limited number of applications with relatively small volume.

We have indicated here a freehand sketch of the item that we desire with the approximate dimensions. Any assistance that you may offer in locating a source for us will be appreciated.

CHARLES DOUGLAS
Purchasing Agent
McCray Refrigerator Co. Inc.
Kendallville, Ind.

new
KOLD-SET®

FOR COATING CORES AND MOLDS

- **controlled viscosity**
  Exact manufacturing standards assure consistent uniformity. Kold-Set Zircon Wash applies smoothly without tear drops or runs.
- **perfect suspension**
  Same suspension value over extended periods makes possible the application of uniform coatings day-in and day-out.
- **deep penetration**
  Binders and penetrating agents are carried deep into the sand surface securely anchoring the wash and forming a hard surface around the core.
- **more economical**
  Kold-Set Zircon Wash comes in dry powder form. You pay only for useable material and not for water. It is most economical because it covers more surface area.
- **easy to use**
  Application by brush, swab or spray gun immediately penetrates the core surface and flattens out, thereby reducing brush marks and providing an even wash film.

Write for
"Quick Facts"
about
KOLD-SET
ZIRCON WASH

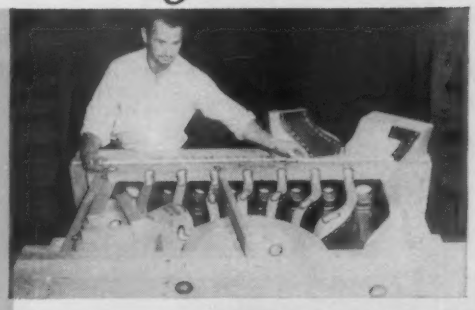
Circle 613 on Page 51

KOLD-SET®

The Original Kold Setting Binder

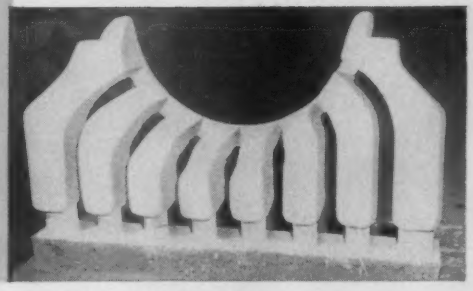
1.

Core box for making 500 lb. Zircon steam chamber core prior to pouring with Kold-Set sand.



2.

500 lb. Zircon steam chamber core must clean through 4" dia. ports. Double coat Kold-Set Zircon Wash applied green. Oven dried 8 hours at 425°F., rewashed, dried 4 hours.



FORMULA FOR QUALITY

at ATLANTIC STEEL CASTINGS COMPANY

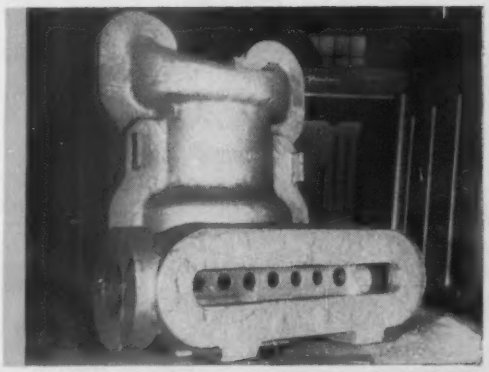
Chester, Pennsylvania

Atlantic is producing high-pressure steel castings of highest quality at substantially lower cost with Kold-Set cores.

3.

Turbine Base Casting (finished weight, 6500 lbs.) Direct cleaning time for steam chamber reduced from 5 days to less than 8 hours with Kold-Set core.

CLEANING TIME REDUCED 4 FULL DAYS



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—High grade raw materials and quality control during manufacture make KOLD-SET stand out first in performance—always uniform and made to the original formulation.

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—A new method, such as the KOLD-SET process, must be introduced with service. Our engineers are experienced and can instruct in the proper method of application so you will derive the best performance at the greatest savings.

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ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES

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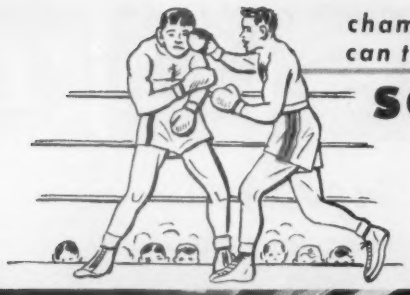

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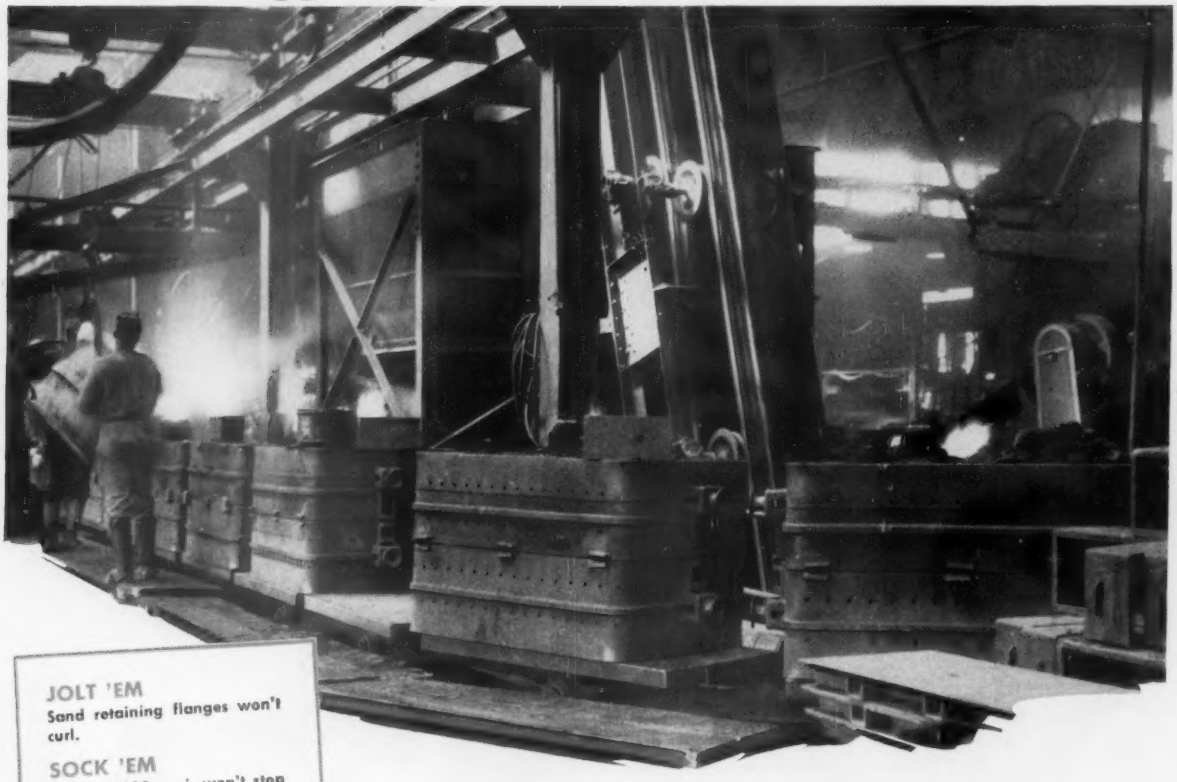
Sterling FLASKS



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PIONEERS IN THE MANUFACTURE OF FOUNDRY FLASKS

WHEREVER METALS ARE CAST FOUNDRY

February 1958

Do Something About It!

With Congress back and in a spending mood, and with a record peacetime national budget of $74 billion awaiting approval, forces are developing which should change the business trend within the next few months. What this sputnik spree will mean to our future long-range economic well being remains to be seen, but short range it should provide a shot in the arm for some of our sagging industries.

Strange as it may seem, the present recession offers a foundry an opportunity to test its muscles and set its house in order. The emphasis on merchandising, provided by the various foundry trade associations during recent years, is being given a real workout. For the first time in history, many foundries are putting into practice the fundamentals of good selling. Furthermore, these associations are continuing to provide an impetus for further strengthening of that phase of a successful foundry operation. The series of marketing clinics now being held by the Gray Iron Founders' Society in various sections of the country is an excellent example of a serious effort for improvement on the part of an industry.

Slackening of orders and curtailment of operations also provide the time for improving plant practices. We have talked frequently since World War II of the need for eliminating waste in foundries. But heavy demands for castings, and at times a shortage of capacity to meet those needs, too often lulled management into a satisfied frame of mind. Waste was not always checked as it should have been, and additional sloppy procedures frequently developed.

Now the picture has changed. Foundries must produce castings with maximum economy and best practices if competition in price and quality is to be met. Today, management of foundries cannot afford the luxury of waste.

So let's see if materials are being wasted, or if the right materials for the job are being used. Let's find out if labor is being wasted due to lack of planning or improper direction. Let's see if scrap losses are too high. Let's see if equipment is worn out or obsolete, thus adding to the cost of production. Let's clean up the plant and see that safety is built into the operation.

And if you find waste in any form, now is the time for you to do something about it.

Frank G. Steinbach

Editor

Gleason Works Achieves . . .

Newness in a Foundry

Electric and oil melting of iron, acoustical treatment, good lighting, adequate ventilation, convenient service outlets, and modern construction are features of Gleason's new foundry

By ROBERT H. HERRMANN
Associate Editor

THE Gleason Works of Rochester, N. Y., is the world's foremost manufacturer of automatic precision machinery for the production of bevel and hypoid gears as well as Curvic couplings.

As another major step in its continuous plant and equipment modernization, and to provide the latest and most efficient facilities for producing the high-grade castings required in Gleason machines, a complete, new foundry recently has been constructed and put into operation. The old foundry building and equipment were discarded.

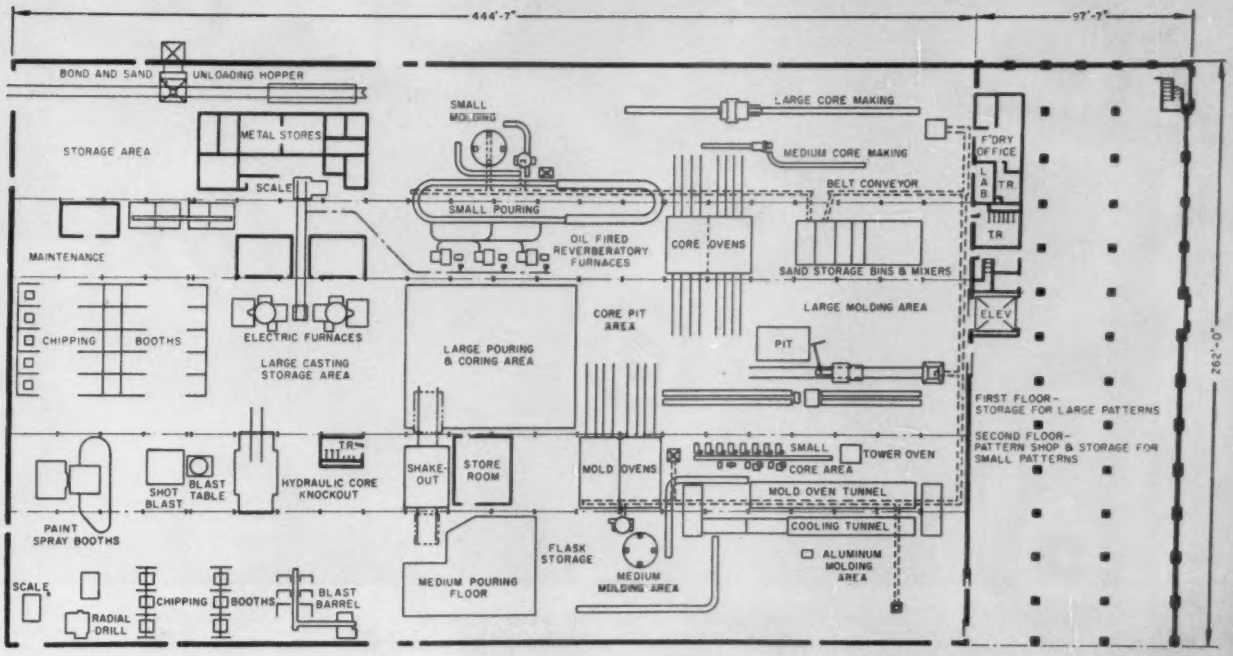
The new foundry is a well-equipped building incorporating modern building materials and service, lighting, heating, ventilating, and acoustical equipment. The building which houses the foundry, pattern shop, and pattern storage is 542 ft long and 262 ft wide. Exterior walls above a 5-ft sill wall are made of aluminum. Walls and roof are insulated with Fiberglas. Large window areas are glazed with heat and glare-resistant glass.

Inside, the ceiling and side walls are soundproofed with perforated aluminum panels backed by Fiberglas. Crane runways are surfaced with vibration-damping material to reduce noise. Color-improved mercury fluorescent reflector lamps provide 40 foot-candles of uniform illumination in production areas. Service bays are lighted by 500-w incandescent reflector lamps. Twenty roof fans over melting and pouring areas remove smoke and fumes. In addition, localized exhaust units are provided at individual pieces of equipment which produce dust or fumes. Exhausted air is replaced with filtered fresh air, heated in winter, distributed throughout the foundry by ducts. Additional heat is supplied by hot water radiation around the building perimeter and by unit heaters over all outside doors.

Two independent vacuum systems with inlets to which hoses on portable sweepers may be connected, are located in the basement, on the main floor, and on the mezzanine for cleaning mold cavities, equipment, floors, and building structural work. These systems, which also remove dust accumulated in bag collectors, are cross-connected to assure continuous operation should a failure occur in either system. Idlers on all belt conveyors are lubricated once a week by systems which dispense lubricant by lever control.

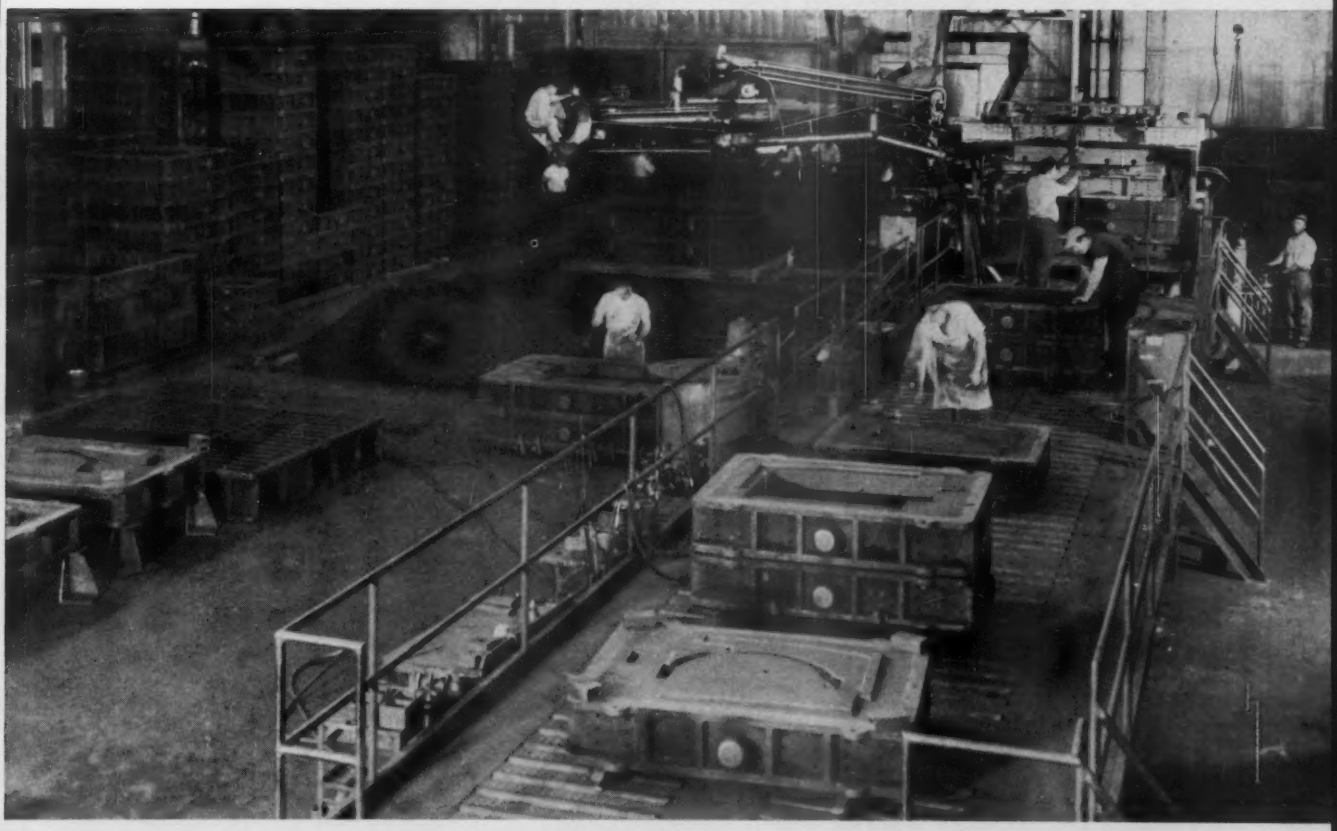
Almost every building column in the medium and large molding areas has vacuum, air, water, and 110-v electrical outlets. In addition, 220-v, 440-v, and gas outlets are mounted on columns in areas requiring those services. The 440-v outlets are used primarily for welding equipment employed for equipment repair work.

Fire protection is available at numerous points



Foundry facilities are laid out to achieve maximum efficiency and yet maintain sufficient flexibility for the production of castings over a wide size range

Largest molds made in the foundry are rammed on the floor by the sandslinger in the background. The slinger also rams molds on the conveyor in foreground



This rollover draw machine is mounted in the roller conveyor which handles flasks up to 66 in. square in the large mold foundry section

in the foundry. Sprinkler systems cover paint spray booths and bag dust collectors. Six water hose reels are located in strategic areas, and water hydrants are spotted on the roof. Access ladders are attached to the building for each roof level.

All in all, construction engineers gave much attention to those details which make a new building truly modern. A few additional examples are the provision of kick-out escape panels in the doors of batch ovens so that a man accidentally shut inside can get out, the attachment of protective rails over crane bus bars so that a swinging chain cannot short the circuit and burn out a link of the chain, and the mounting of electrical equipment such as unit substations, transformers, motor control centers, and power panels in rooms on the mezzanine under positive air pressure to keep out dust and reduce maintenance.

Foundry Production—Gray iron casting capacity is devoted entirely to parts for Gleason products. From 30 to 35 tons of gray iron castings weighing from a few ounces to 14 tons are produced in an 8-hr day, with metal melted in electric arc or reverberatory furnaces. A small quantity of aluminum castings weighing up to 300 lb and some lead counterweights also are produced.

The foundry is laid out in five bays, each running the length of the foundry. A central bay, 70 ft wide and 45 ft high, is flanked by two service bays 35 ft wide and 32 ft high with a mezzanine 18 ft above floor level. The two outside bays are 60 ft wide and 31 ft high.

Overhead cranes with capacities from 10 to 40 tons traverse the 60 and 70-ft production bays. Traveling wall bracket cranes along each side of the 70-ft bay handle loads up to 2 tons.

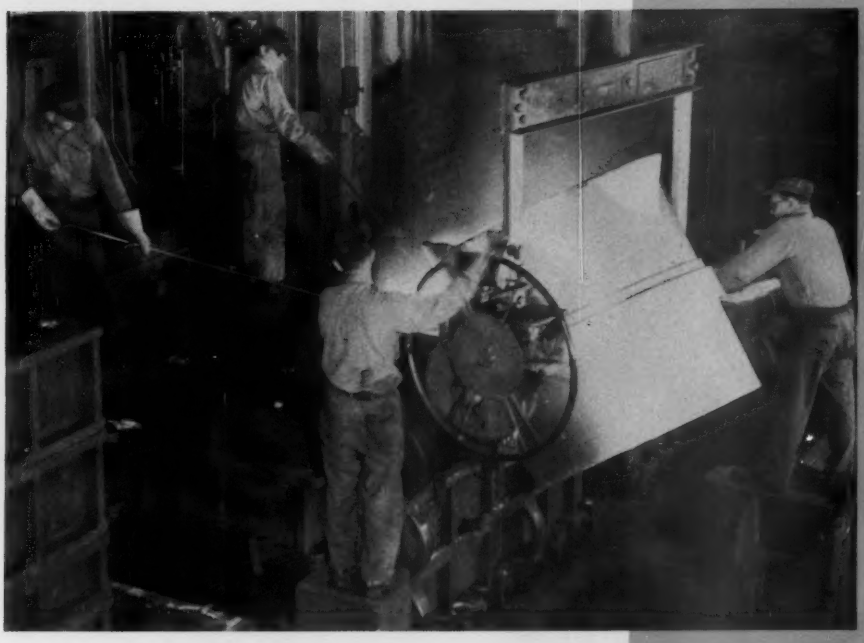
The service bays accommodate most of the foundry process equipment at floor level. Electrical equipment, heating and ventilating units, and dust control equipment are located on the mezzanines above the service bays.

Sand Storage and Mixing — Front-end loaders empty new sand from box cars through a floor grate to a subfloor hopper from which a 400-ft-long inclined belt conveys it to storage bins over the mullers. Bulk bonding clay delivered in box cars is unloaded through a grated chute opening to a bucket elevator. An overhead screw conveyor feeds the clay to a large storage bin near the unloading area. Gates in the bottom of this bin release clay to buckets, which are trucked to the muller area as needed and emptied by crane into smaller bins over the mullers.

Pea coke used in large cores and molds is unloaded from trucks or freight cars through a grated chute and moved by vibrating conveyor, bucket elevator and vibrating pan feeder to storage bins in the receiving area. Industrial trucks carry bucket loads to the coremaking area as needed. All transfer points in the sand, clay, and coke handling systems are dust controlled.

Pitch, seacoal, and bentonite are delivered in bags on pallets and moved to the mullers by fork truck. They are hoisted to a catwalk and emptied into storage bins from that point.

Core and mold sands are prepared in a central area by five mullers. Two have capacities of 4000 lb, two of 2000 lb and one of 800 lb. Seven overhead bins supply new and used sand and the various additives. Three weigh larries traveling on rails under the bins deliver sand to the mullers. A button-controlled vibrating feeder under additive



Workers pour large molds with bull ladles carried by bridge crane directly from electric furnaces

Medium molds are finished and coated with wash on a roller conveyor then set on cars which carry them through the drying oven

bins feeds the material to weigh hoppers over the mullers. Water is metered and oil is added from hand containers. Prepared sand is delivered by an underfoot and overhead belt system to points of use. Indicating lights on a master panel show where sand is needed. Delivery to those points is automatic through pushbutton control.

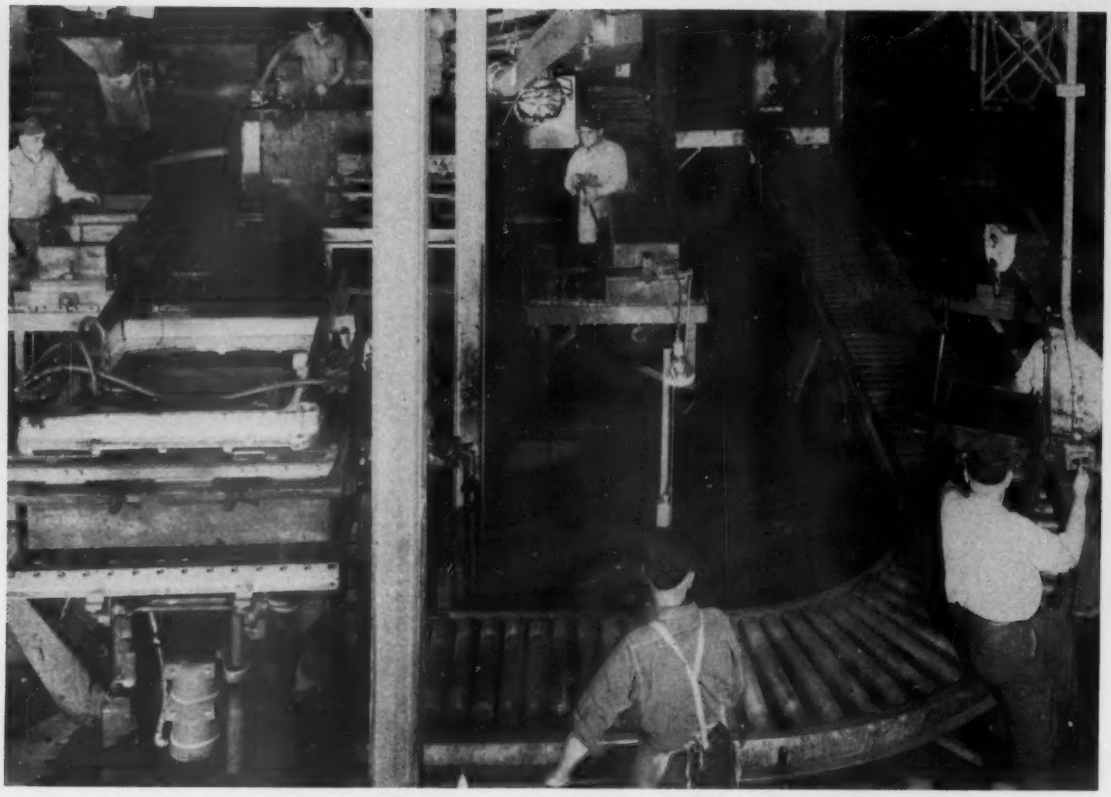
Pitch-bonded sand is used for molding medium and large castings. Naturally-bonded green sand is used on the small-casting floor. Cores are a conventional oil-sand mix. Sand formulations and properties are given in the accompanying table.

GREEN MOLDING SAND		PITCH MOLDING SAND
1500 lb Heap sand		3800 lb Heap sand
15 lb 7M Dorchester sand		200 lb 3½M Millville gravel
1½ qt Wheat flour		100-150 lb Clay
1½ qt Seacoal		20-50 lb Balanced pitch
1 qt Clay		1 gal Cereal
0 - 1 qt Southern bentonite		1 gal Western bentonite
	Properties	
4.7 - 5.5%	Moisture	6.2 - 6.7%
40 - 50	Permeability	85 - 95
162 - 164 grams	Density	180 grams
10.5 - 11.5 psi	Green compression	6.0 - 7.0 psi
0.020 - 0.025 in./in.	Green deformation	0.025 - 0.030 in./in.
6.8 - 7.8%	Loss on ignition @1650° F	7.5 - 8.0%
75	AFS fineness number	38 - 40
10.5 - 11.5%	Clay content	7.5 - 9.5%
Not measured	Dry shear	50 - 60 psi

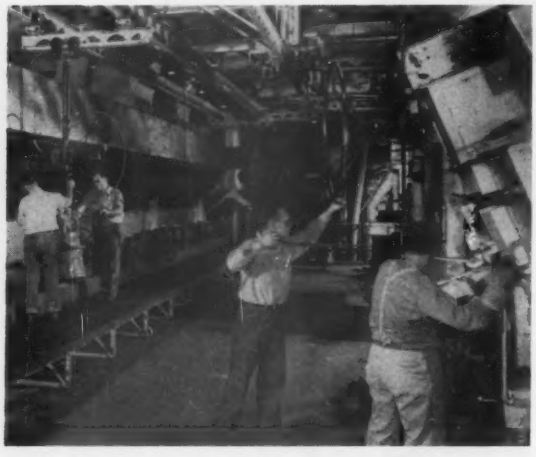
OIL CORE SAND		PITCH CORE SAND
500 lb N. J. silica sand, No. 80-1		3400 lb Heap sand
300 lb Mexico Bay sand		600 lb 3½M Millville gravel
4 gal Water		70 - 100 lb Balanced pitch
11 qt Urea resin		0 - 20 lb Clay
8 qt Cereal		½ gal Cereal
3 qt Western bentonite		
3 qt Kerosene		
	Properties	
Not measured	Moisture	6.5 - 7.0%
	Permeability	75 - 85
	Density	182 grams
	Green compression	4.0 - 5.0 psi
	Green deformation	0.020 - 0.025 in./in.
	Dry shear	60 - 70 psi

Large Mold Operations—A mobile sandslinger operating along a 90-ft track rams most of the molds produced in this area. Flasks from 36 to 66 in. square are rammed on a double roller conveyor built about 30 in. above floor level along one side of the slinger track. Patterns are wheeled in on dollies from the adjacent storage room to the end of this conveyor. A wall bracket crane lifts patterns from the dollies to metal pattern-board clamping fixtures previously positioned on the conveyor. The same crane sets flasks over the patterns. Dogs on an air-cylinder pusher between the conveyor sections push the assemblies through processing operations. Molders perform their jobs from metal grating walk-ways.

The slinger prefills and rams the molds. Spill sand falls through the conveyor and the grated walk-way to a vibrating conveyor which feeds a bucket elevator returning sand to the slinger hopper. Rammed mold halves are inverted by a roll-over draw machine at midpoint in the 120-ft-long conveyor. Finishing operations on the second half of the conveyor include spraying with a graphite



Small molds are rammed by sandslinger on a turntable then rolled over to a roller conveyor for closing. Finished molds are set on car conveyor at right for pouring



Workers pour small molds under vent hood at the left. Oil-fired furnaces at right supply iron

wash and the setting of pitch sand cores if required.

Loose pattern work and large molding is done on a floor on the other side of the slinger track. Flasks here range from 36 in. square to 115 x 145 in., the average size being 90 x 120 in. Extremely large castings are made in a 15 x 25-ft concrete pit.

Most molds in this area are prefilled and rammed by the slinger. Generally the false cope method is used in ramming drags. The true cope is rammed on the finished drag. Then the mold is separated and the halves moved by crane to the finishing area where they are coated with wash, and pitch sand cores, if required, are set.

A bridge crane sets these molds and those from the conveyor operation on either of two cars which are moved into gas-fired drying ovens by underfloor, endless chains. Each oven measures 20 x 35 x 13 ft high, and molds are dried at 550° F for 5 hr. The cars then are pulled from the ovens, and cranes remove molds to the coring and pouring floor where touch-up operations are performed and additional cores set. Cranes are used to close the molds and pour them with iron from the electric furnaces.

Cooled molds are lifted to a 12 x 14-ft shakeout car of 50 tons capacity. The car is self-propelled by an electric motor along rails into a room from which fumes and dust are exhausted to a collector. The shakeout room has doors at opposite ends; castings made in the medium foundry are brought through the other doorway by a second car. Sand from the shakeout falls to a vibrating feeder to a 7 x 36-ft rotary breaker-cooler screen and then moves by belt to storage bins over the mullers.

When the car is backed out of the shakeout room, a bridge crane returns flasks to the large molding area and sets castings on metal skids, which are moved by a 10-ton platform truck into a 20 x 20-ft core knockout room. Inside the room an operator in an enclosed, electrically propelled

Small cores produced along this belt are set on skids and trucked to the small-mold area

cab controls its movement along a rail around the inside of the room and directs a stream of water at 800 psi against cores in the castings. Skidloads of washed castings are trucked out of the room to subsequent cleaning operations.

Medium-Size Mold Operations—Molds in this area are produced on a four-station, 16-ft-diam, floor-level turntable. Patterns are mounted on plates clamped to roller conveyor sections comprising the waist-high turntable stations. Flasks from 17 x 17 in. to 30 x 36 in. plus some three-compartment flasks measuring 18 x 42 in. are used. The larger flasks are 8 in. deep. They can be bolted together to obtain depths required to handle various size castings. Air hoists mounted on jib cranes set the clamping plates on at the first station. Molds are prefilled and rammed by a remotely controlled slinger at station two. At station three, molds are struck off and bottom boards set in place, and at the fourth station the mold assembly is rolled into a rollover draw machine. Spill sand is returned by vibrating feeder and bucket elevator to a hopper over the plate feeder for the slinger.

Drawn mold halves are deposited on an L-shaped gravity roller conveyor. They roll down to a finishing area where they are touched up and coated with graphite wash. Then they are loaded by crane and air hoist to flat cars which ride on rails through a 70-ft-long oven. Cars are indexed through the oven by a hydraulic cylinder and ram. After a 1½-hr bake at 600° F, cars emerge to a hydraulically-propelled transfer car, which shuttles them to a 60-ft-long cooling tunnel parallel to the oven. As the mold cars are pulled off the transfer car by hydraulic cylinder, all mold cars ahead are indexed through the tunnel. During the 1¼-hr cooling cycle, outside air is blown over the molds through louvered vents. Used air is exhausted from the tunnel to the atmosphere.

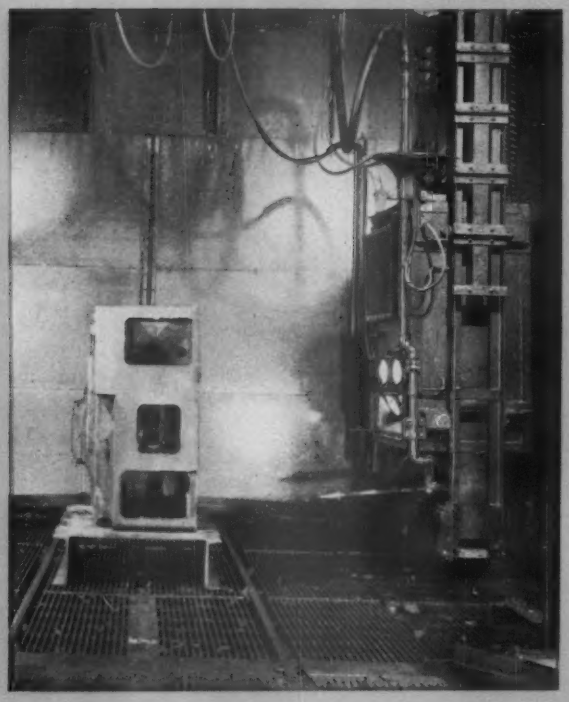
Cooled molds are unloaded from the cars by a hoist mounted on a bridge crane and set on a gravity roller conveyor for movement to the pouring floor. Here they are removed by bridge crane and set on the floor for coring. Then they are closed and clamped.

Platform trucks carry tilt-type ladles of molten metal from the electric furnaces to the pouring area, where they are lifted by the crane and positioned for pouring. The pouring area is partitioned by short walls suspended from the ceiling to permit efficient operation of ceiling exhaust fans.

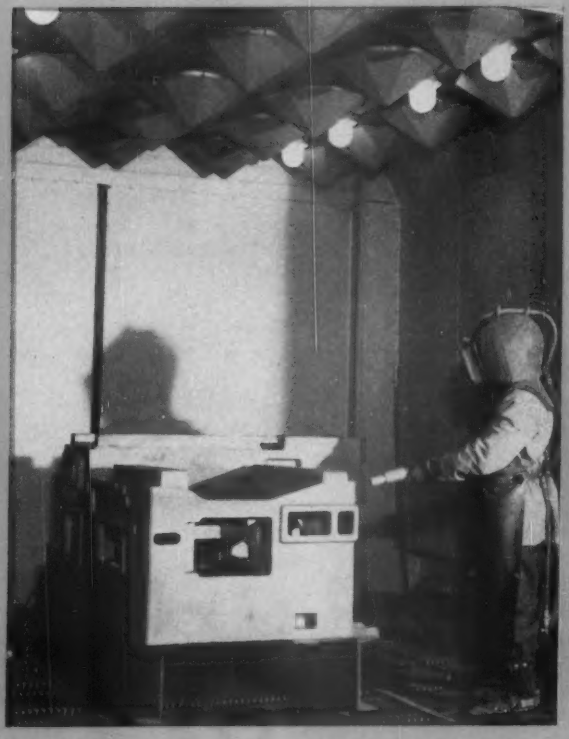
The crane loads poured molds to a powered 10 x 12-ft shakeout car for movement into the shakeout room. This car also handles molds from the large mold area as described previously. After shakeout, molds are unclamped, and the crane returns flasks to the molding area. It also sets castings on grid-bottom metal skids for transport by platform trucks to the hydraulic core knockout room.

Small Mold Operations—Molds here are made on a turntable similar to that used in the medium mold area. Patterns are mounted on clamping plates, and flask sizes are 20 x 20, 14 x 24, or 17 x 43 in. The 17 x 43-in. size is a three-compartmented flask which has replaced 12 x 12 and 12 x 16-in. units. In many cases both cope and drag are rammed on a single turntable section. A minor difference between this operation and that in the medium mold area is that flasks are prefilled with sand from a chute at the flask loading station instead of from a plow-off on the slinger belt at the ramming station.

Half molds at the last turntable station enter a rollover draw machine and are deposited on a gravity roller conveyor where cores are set and molds closed by crane. Molds are clamped, and a dry sand pouring basin is set over the sprue hole. A code letter is marked on the tops of molds with dry sand, like decorating a cake, to indicate the type of iron required for that mold. Finished molds



Worker in the movable cab at right directs water jet for removing cores from castings



After core removal and chipping operations, large castings are blast cleaned in a room

are hoisted to a car conveyor. Cars are indexed around the loop 5 ft at a time by an air cylinder ram and dog arrangement.

Two squeezer machines and a rollover unit inside the loop handle short-run molding jobs. Sand is fed to each by overhead hoppers.

Molds are poured along a compensating air exhaust hood with 600-lb, hand-operated ladles suspended from a monorail so arranged with switches that ladles can be moved in front of any of three 1-ton capacity, oil-fired, tilting reverberatory furnaces.

The mold conveyor continues through a cooling tunnel. At the end of the tunnel, clamps are removed from the molds. An air-cylinder ram then pushes molds off the cars to a hooded shakeout. The three-compartmented flasks are placed on a gravity roller conveyor for return to the turntable loading point. Single flasks are loaded on hand-pushed dollies for movement to the same point. Flasks for squeezer and rollover machines are returned on the mold conveyor. Castings are hooked off the shakeout to tote boxes and moved by lift trucks to the cleaning room.

Sand from the shakeout and spillage around the turntable is carried by belt to bins over the mullers. First, however, it passes over a magnetic pulley and through a rotating screen for removal of scrap material.

Aluminum and Lead Castings—These castings are produced in an area adjacent to the medium molding floor. Molds for aluminum castings are made on two squeezer machines handling 12 x 12 and 12 x 16-in. flasks. A jolt rollover machine uses flasks measuring 17 x 17, 18 x 42, and 36 x 36 in.

Gated hoppers above each molding machine supply sand. Molds from the squeezers are set off on 8-ft-long pallets which ride on two floor-level gravity roller conveyors extending behind the machines. Molds are poured on the conveyors.

Mold halves from the jolt machine are rolled off to a waist-high gravity roller conveyor where cores are set. A bridge crane moves halves to the floor, where they are closed and poured.

All molds are made with a proprietary green sand prepared at the central mulling area. Cores are conventional dried oil-sand mixes or CO_2-hardened, sodium-silicate bonded sand. Aluminum is melted in a 300-lb gas-fired furnace.

Poured molds are set on a vibrating shakeout. Flasks are returned to the molding section, and castings fall into a tote box which is trucked to the cleaning room. Sand falling through the shakeout is conveyed by belt to a bucket elevator which empties into a vibrating screen about 8 ft above the floor. Screened sand falls to a bucket and is moved by truck and emptied through a floor grating to a belt conveyor for return to the special storage bin above the mullers.

Lead counterweights are produced in this area in three permanent molds. Two gas-fired furnaces, one holding 300 lb and the other 50 lb, supply molten lead.

Iron Melting Practice—Pig iron, scrap, and alloy-

ing elements are brought inside the building in railroad cars. A 10-ton crane with magnet unloads ferrous materials to open-top bins constructed of railroad ties. Nonferrous metals which arrive on pallets are unloaded by fork truck and stored on the floor. They are trucked to the nonferrous foundry area.

Ferrous metal for the reverberatory furnaces is stored in a three-sided bin. Charges weighing 2000 lb are made up by hand in a box resting on a rail car. This car is rolled on and off the scale platform by a chain drive. Analysis and make-up of charges follow:

CHARGE MAKE-UP

	Pig Iron	Returns	Steel	Silvery Iron
Soft iron	1100 lb	890 lb	..	10 lb
Hard iron	900	1050	40	10

ANALYSIS AT SPOUT

	C	Si	Mn	P	S
Soft iron	3.35%	2.10%	0.55%	0.12%	0.05% max
Hard iron	3.15%	2.00%	0.55%	0.12%	0.05% max

Soft iron is used for light-section work, and hard iron for heavy-section work. For very thin section castings the soft iron is inoculated at the spout with graphite and ferrosilicon. Chromium is added to the hard iron for a few large-section castings.

Loaded charge boxes are lifted from the make-up area rail car by an electric hoist suspended from a monorail and pushed to the melting area. Charges are dumped into buckets on skip hoists at each of the three furnaces. Air used for combustion at these furnaces is preheated to about 300° F by a heat exchanger around the stack of each furnace. Metal is tapped at 2700-2750° F.

Electric furnace charges are made up in orange-peel bottom buckets which rest on the charge car under a large funnel. The bridge crane with magnet attached lifts charge components from the open-top bins and drops them through the funnel to the bucket. A remote dial-scale indicates weights of charged materials to the crane operator.

The charge car moves filled buckets to a point between the two direct-arc furnaces. Each furnace is enclosed and vented, and each is capable of melting 6 to 9 tons of iron every 2 hr. A bridge crane in this area lifts the buckets to charge the furnaces. Average charge follows:

Charge Make-Up		Analysis at Spout
Pig iron	580 lb	3.15% C
Cast returns	560	1.90% Si
Cast borings	460	0.70% Mn
Steel turnings	400	0.12% P
Total	2000 lb	0.05% max S

For lightweight castings the iron is inoculated with graphite and ferrosilicon at the spout. For very heavy section castings, 0.25 per cent chromium is added. In addition, ductile iron is produced. Metal is tapped at 2550 to 2900° F, depending upon the castings to be poured.

Why Use Electric Furnaces?—The decision to use electric furnaces to produce iron was based on calculations indicating that the cost of molten metal at the spout is about the same for basic or acid cupolas and electric furnaces. Although the cost of electricity as a fuel is higher than that of coke, the higher energy cost is offset by the ability to use cheaper materials such as punchings, borings, and nonsegregated scrap in the electric furnace charge. These materials are available from the company's machining operations in adjacent buildings.

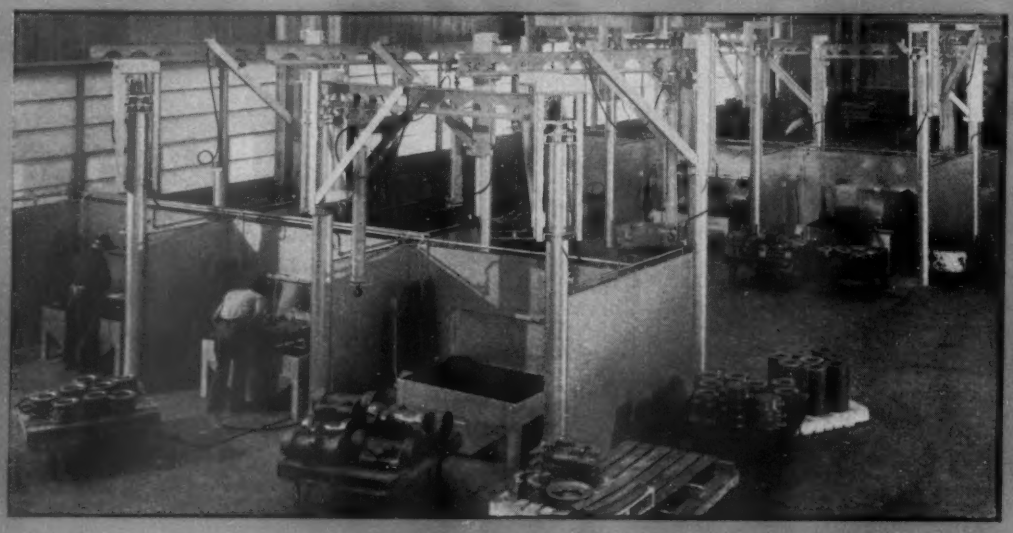
Because these are batch furnaces, hot metal can be delivered to pouring areas on schedules which fluctuate during the daily operation. Chemical analysis of the metal can be held closely during either peak or low demands for metal. Control also can be held closely for the comparatively small amounts of metal needed for alloyed and ductile irons.

Coremaking—The foundry has two coremaking

Chipping and grinding work is performed in soundproof booths. Dirt-laden air is drawn down through floor gratings to the collectors shown

areas. Large and medium cores are made near the central sand preparation area. Cores are hand-rammed in boxes on low wooden horses, and rammed boxes are hoisted by bridge crane to a gravity roller conveyor. Large cores are set on a heavy-duty conveyor; medium cores on a smaller one. Bottom boards are set in place and the boxes pushed to rollover draw units set in the conveyors.

Drawn cores resting on bottom boards are finished and coated with wash on the conveyor extension, then loaded by bridge crane to 7 x 18-ft rail cars which are pulled into 20 x 22-ft batch ovens heated by either gas or oil. Each oven holds two cars, and cores are baked at 450 to 500° F.



Soundproofed, downdrafted booths in the medium-casting cleaning area are equipped with pneumatic hoists on jib cranes for handling castings

Small castings discharged from the shot blast barrel at right are carried on belt conveyors past soundproofed, downdrafted grinding booths

Baked cores are removed from the opposite end of the oven into the large mold area and lifted by crane from the cars to a floor finishing area. The floor at this point is depressed and filled with about 18 in. of sand so that cores can be rolled over and moved without damage. Finished cores are loaded on skids and moved to the molding area by bridge crane.

The small core area is adjacent to the oven used to dry medium size molds. It has ten bench stations along one side of a sliding belt conveyor, with a blower and rollover machine on the other side. Benches, blower, and rollover are equipped with overhead hoppers supplied with sand from a drop-bottom bucket electrically propelled along an overhead monorail. The bucket is replenished with sand from two storage hoppers in the area. One contains pitch sand and the other oil sand. Cores unloaded from tower oven are finished and set on storage racks adjacent to the finishing area or loaded on skids for transport by platform trucks to the molding area.

Casting Cleaning — Large and medium castings from which cores have been removed undergo a rough chipping operation on the floor in front of the core knockout room. A platform lift truck then moves the large castings into a 15 x 15-ft shot blast room. A crane lifts medium size castings to a 6-ft-diam blast table. Trucks then move large cleaned castings to any of 20, three-sided, soundproofed chipping and grinding booths. The booths are arranged in four rows of five booths each and have grated floors through which air is drawn to bag-type dust collectors. Electric trucks carry finished castings to the painting area.

Medium castings are trucked on skids to a group of 12, three-sided, soundproofed booths in another area. These booths are arranged in four rows of three each and are equipped with grated, down-draft pedestals. After cleaning, the castings are moved to the painting area.

Small castings are cleaned in an area adjacent to these booths. They are trucked in boxes from shakeout and dumped into a skip hoist which feeds a shot blast barrel. Cleaned castings are unloaded to an inclined slider belt which feeds a horizontal slider belt operating at 90 degrees to the first. This belt passes between two rows of three soundproofed booths equipped with stand and hand grinders. The booths are down-drafted.

Ground castings are tossed to the same belt and fall off the end to tote boxes for trucking to the painting area.

Castings are painted in two spray rooms down-drafted to a water-washed spray exhaust. Large castings on skids are trucked in and out of one room. Small to medium castings are loaded on wheeled carts which are pulled through the second room by chains attached to an overhead monorail conveyor loop. The conveyor operates intermittently under control of the painter. All castings are weighed as they leave the paint rooms.

Quality Control—Close control is maintained over all foundry sands to attain high standards of casting finish and dimensional accuracy. The

An intermittently-operating overhead monorail conveyor pulls wheeled carts loaded with small castings in and out of a spray painting room

sand laboratory is equipped to determine moisture content, permeability, green and baked strengths, clay content, and grain distribution of molding and core sands. Controlled batches of sand are prepared in a laboratory muller to determine the uniformity of purchased sands, binders, and other additives. Experimental batches are prepared in the development of new and improved mixes. Metallurgical tests are performed in the company's metallurgical laboratory in the machine shop, and samples of melts are taken at frequent intervals and sent to an outside chemical laboratory for analysis.

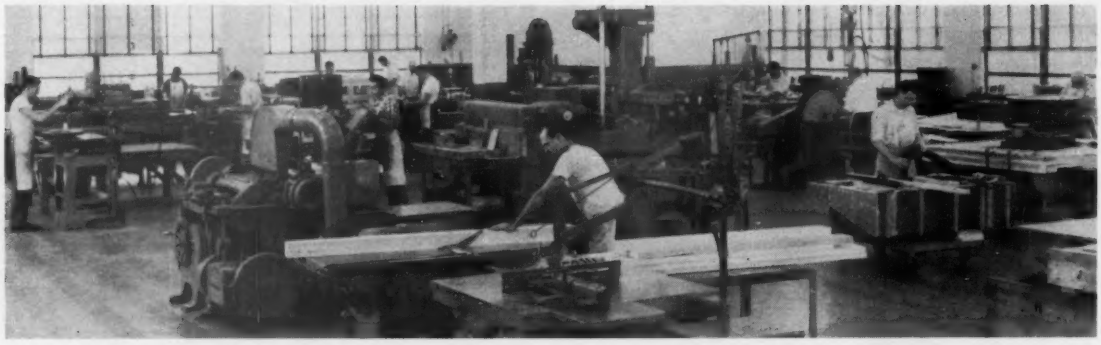
Castings are submitted to routine inspections in the cleaning room and those which must meet hydraulic pressure requirements are tested with high-pressure water equipment.

Pattern Facilities — A two-story pattern shop housing manufacturing and storage facilities is situated at the front end of the foundry. The first floor contains large pattern storage, the pattern storage record room, foundry office, sand laboratory and washroom facilities. Small pattern storage, lumber storage, washroom, and patternmaking facilities are on the second floor. An 18 x 18-ft hydraulic elevator of 5 tons capacity transfers lumber and patterns between floors.

Special precautions have been taken against fire. The roof and floors are reinforced concrete. Columns and beams are fireproofed, the building is protected by automatic sprinklers, and water reel hoses and foam extinguishers are strategically situated. All major doors into the foundry are double metal clad.

The patternmaking area is lighted to 90 foot-candles by fluorescent lamps. Incandescent lighting of 20 foot-candles is used in storage areas. Reel-mounted extension cord lights supplement this

NEWNESS IN A FOUNDRY



The patternmaking room is lighted to 90 footcandles by fluorescent lamps. Bridge cranes for handling heavy work traverse the entire shop

lighting in the small pattern storage area.

Lumber entering the storage room is dated on delivery. Every effort is made to keep it six months before using. Wood from storage is carried to the middle of the shop for planing and sawing to rough size, then it is distributed to the work areas. Patternmakers' benches are placed along two window walls. Patternmaking equipment is new and includes the latest units available both in this country and from Europe. Power saws, jointers, sanders, and other tools are aligned behind the benches. Lathes and milling machines are placed along an inside wall. Pattern repair, gating changes, and apprentice work is done on benches along the centerline of the room.

All machines are down-drafted, and refuse on the floor is swept into floor openings. Dust, shavings, and chips are piped to a cyclone collector and hauled to an incinerator.

Bridge cranes for handling heavy work in process traverse the entire shop. Patterns and other equipment are brush-painted at a bench equipped with an exhaust hood.

In addition to patterns and coreboxes, the shop makes full size wooden models of all new machines to be produced by the company.

● An extra copy of this article is available until supply has been exhausted. Check Reader's Service Card, Page 51.

Major Equipment Suppliers to Gleason Works Foundry

Alemite Div., Stewart-Warner Corp., Chicago .....Lubrication equipment
Appleton Electric Products Co., Chicago .....Electric reels
Louis Allis Co., Milwaukee .....Motors
American Air Filter Co., Louisville, Ky...Wet dust collectors, heating filters
American Blower Co., Detroit .....Make-up air units
Archer-Daniels-Midland Co., Federal Foundry Supply Div., Cleveland .....Core blower, wire straightening machine
Aro Equipment Co., New York .....Hoists
Austin Co., Cleveland .....Building design and construction
Automatic Transportation Co., Chicago .....Platform lift trucks

C. O. Bartlett & Snow Co., Cleveland .....Foundry layout and sand handling system
Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago .....Sandslingers, plate feeders, rollover machines

Campbell-Hausfeld Co., Harrison, Ohio .....Aluminum furnace
Chicago Pneumatic Tool Co., New York .....Corebox vibrators
Clark Equipment Co., Battle Creek, Mich. .....Fork trucks
Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio .....Electric hoists and tramrails

Delta Mfg. Co., Milwaukee .....Planer, tilting arbor saws
DeVilbiss Co., Newark, N. J. .....Paint spray booths
Harry W. Dietert Co., Detroit .....Sand testing equipment

Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago .....Refractory gun
Eclipse Fuel & Engineering Co., Rockford, Ill. ....Reverberatory furnaces
Thomas A. Edison Inc., West Orange, N. J. .....Batteries
Electric Controller & Mfg. Co., Cleveland .....Crane controls, magnet
Elwell-Parker Electric Co., Cleveland .....Platform lift trucks

Falk Corp., Milwaukee .....Reducers
Fairbanks, Morse & Co., Chicago .....Scales
Foundry Equipment Co., Cleveland .....Tower core oven
Fox Grinders Inc., Pittsburgh .....Cutoff machine

General Electric Co., Schenectady, N. Y...Transformers, switch gear, motors
Goulds Pumps Inc., Seneca Falls, N. Y. .....Pumps
Goodyear Tire & Rubber Co., Akron, Ohio .....Belts

Hanna Engineering Co., Chicago .....Air cylinders
Harnischfeger Corp., Milwaukee .....Bridge cranes
Harshaw Chemical Co., Cleveland .....Combustion furnace
Hartzell Propeller Fan Co., Piqua, Ohio .....Exhaust fans
Hauck Mfg. Co., Brooklyn, N. Y. .....Gas torches
Herman Pneumatic Machine Co., Zelienople, Pa. .....Large core and mold rollover machines
Hewitt-Robins, Passaic, N. J. .....Shakeouts
Frank G. Hough Co., Libertyville, Ill. .....Front end loader
Hydro-Blast Div., Guardite Co., Chicago.....Rod sorter and straightener

Ingersoll-Rand Co., New York .....Hoists, air compressor
International Molding Machine Co., La Grange Park, Ill...Squeezer machines

W. A. Jones Foundry & Machine Co., Chicago .....Reducers

Kindt-Collins Co., Cleveland .....Disc sanders
Kinnear Mfg. Co., Columbus, Ohio .....Overhead doors, shakeout house

Lehigh Foundries Co., Easton, Pa. .....Air cylinders
Lindberg Engineering Co., Chicago .....Melting furnace

Martin Engineering Co., Kewanee, Ill. .....Vibrators and flask pins
Master Pneumatic Tool Co., Orwell, Ohio .....Portable tools
Mathews Conveyer Co., Ellwood City, Pa. .....Roller conveyors
Carl Mayer Corp., Cleveland .....Mold and core ovens
Minneapolis-Honeywell Regulator Co., Philadelphia .....Potentiometers, control instruments
Mixing Equipment Co., Rochester, N. Y. .....Mixers
Modern Equipment Co., Port Washington, Wis. .....Pouring ladles

National Engineering Co., Chicago .....Mullers and controls

Oliver Machinery Co., Grand Rapids, Mich. .....Woodworking machinery
Otis Elevator Corp., Buffalo .....Hydraulic elevator

Pangborn Corp., Hagerstown, Md. ...Dust collectors, casting washer, and related casting cleaning equipment
Pyrometer Instrument Co., Bergenfield, N. J. .....Optical pyrometers

Raymond Corp., Greene, N. Y. .....Fork truck
Roura Iron Works, Detroit .....Dump hoppers

Claude B. Schneible Co., Detroit .....Pouring hoods
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. .....Jib cranes
Simplicity Engineering Co., Durand, Mich...Vibrating conveyors and screens
Spencer Turbine Co., Hartford, Conn. .....Vacuum cleaners
Square D Co., Detroit .....Electric control panels
Standard Electrical Tool Co., Cincinnati .....Casting grinders
Syntron Co., Homer City, Pa. .....Vibrating feeders

Tabor Mfg. Co., Lansdale, Pa. .....Molding machine
G. H. Tennant Co., Minneapolis .....Floor sweeper
Thor Power Tool Co., Aurora, Ill. .....Hand tools
Tomkins Johnson Co., Jackson, Mich. .....Air cylinders

Wadkin Co., Leicester, England .....Woodworking machinery
Jervis B. Webb Co., Detroit .....Overhead conveyor
Westinghouse Electric Corp., Pittsburgh .....Water coolers, motors
Wheelabrator Corp., Mishawaka, Ind. .....Electric furnace dust collector
Whiting Corp., Harvey, Ill. .....Electric furnaces, tramrail

Yale & Towne Mfg. Co., Philadelphia .....Platform lift trucks
Yates American Woodworking Machinery Co., Beloit, Wis. .....Jointer

Cost Accounting Procedures

For the Gray Iron Foundry

Estimates of the costs of individual jobs are of utmost importance. They tell the foundryman when to accept or reject jobs on which he is quoting. Actual cost sheets show him how valid quotations were

By ALBERT E. GROVER
Cost Consultant
Cleveland

EFFECTIVE operation of a cost system in a small jobbing gray iron foundry requires three major activities: 1. Preparation of estimates of the costs of individual jobs on which sales policies are predicated. 2. Accumulation of actual costs of metals, labor, and burden (overhead expense) required to produce each job. 3. Provision for comparing the several elements of costs for each job with the same elements as those recorded on the estimate sheet.

Estimating—Probably no document in daily use by the foundry exceeds the estimate sheet in importance. The success or failure of a business depends on it. Fig. 1 shows an estimating form which is both comprehensive and simple to use.

Procedures for the establishment of estimating bases, calculation of detailed costs, and compilation of the data for establishing jobs costs for sales quotations were described in the December, 1952, and January, 1953, issues of FOUNDRY. Since the estimate sheet is an important management tool, however, it is worthwhile to review some of the important fundamentals of applying the cost of operating activities.

Melting—In most jobbing gray iron foundries, the cost of melting iron varies with the class which is melted. This condition makes it necessary to set up standard or normal costs per pound for each separate class.

Coremaking—For effective cost estimating, separate consideration is given to preparing the core mix, forming cores, cleaning, pasting, assembling, and baking.

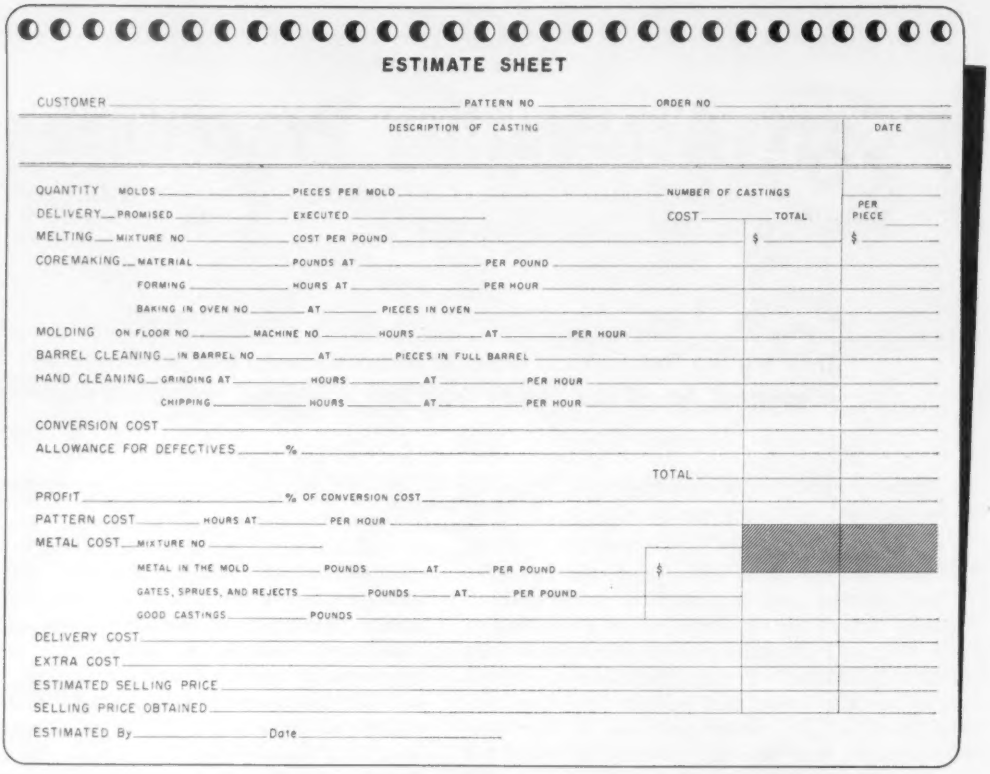
There is no consistent relationship between the cost of core materials and any cost element making up the cost of forming the various shapes and sizes of cores. It is necessary to calculate the cost per pound of the materials. To the sum of the cost of components must be added those of labor and overhead related to mixing. The total thus obtained is divided by the weight of the completed mixture to arrive at the cost per pound to be used in calculating the cost of each job.

Determining the cost of forming a core requires measurement of the labor expended plus the overhead applicable to the operating hours, rather than a percentage of the direct labor. There is no continuing relationship between the several cost elements in overhead and the direct labor. For example, an operator may earn $2.50 an hour for making an intricate core, whereas another operator may earn less for producing a simple core. Variances in hourly earnings of employees making cores on a piecework or premium basis also require the application of coremaking overhead at an hourly rate.

The cost of baking cores is difficult to determine. Its importance is sufficient, however, to warrant the exercise of considerable common sense in preparing and using a method of applying to the cost of jobs. The following procedure is suggested for applying baking costs to individual kinds and sizes of cores:

Prepare a cost table for each type and size of baking facility. Such a table records the normal cost of building expenses, equipment expenses, heat, power, maintenance, supplies, labor, and labor fringe expenses. The total of these expenses is divided by the number of cores that will fill the oven for efficient operation, the result being the cost per piece. When cores of more than one kind and size are baked simultaneously in the same oven, the cost is determined by estimating the number of cores of each kind that would fill the oven if baked separately. Applying the cost per piece yields a proper charge for baking each kind of core. These costs may be adjusted to take up only the actual operating cost of the oven.

Molding—Variations in kinds and sizes of castings produced make it necessary to establish costing rates for the different operating facilities required to prepare molds. Values of the different molding equipment are not the same. Costs of operating these facilities necessarily vary out of proportion to the wages paid to individuals setting up the molds. Therefore a uniform overhead rate based on labor dollars will produce inaccurate and useless job cost information. The wise foundryman



ESTIMATE SHEET

CUSTOMER _____ PATTERN NO _____ ORDER NO _____

DESCRIPTION OF CASTING _____ DATE _____

QUANTITY MOLDS _____ PIECES PER MOLD _____ NUMBER OF CASTINGS _____

DELIVERY PROMISED _____ EXECUTED _____ COST _____ TOTAL _____ PER PIECE _____

MELTING MIXTURE NO _____ COST PER POUND _____ $ _____ $ _____

COREMAKING MATERIAL _____ POUNDS AT _____ PER POUND _____

FORMING _____ HOURS AT _____ PER HOUR _____

BAKING IN OVEN NO _____ AT _____ PIECES IN OVEN _____

MOLDING ON FLOOR NO _____ MACHINE NO _____ HOURS _____ AT _____ PER HOUR _____

BARREL CLEANING IN BARREL NO _____ AT _____ PIECES IN FULL BARREL _____

HAND CLEANING GRINDING AT _____ HOURS _____ AT _____ PER HOUR _____

CHIPPING _____ HOURS _____ AT _____ PER HOUR _____

CONVERSION COST _____

ALLOWANCE FOR DEFECTIVES _____ % _____

TOTAL _____

PROFIT _____ % OF CONVERSION COST _____

PATTERN COST _____ HOURS AT _____ PER HOUR _____

METAL COST MIXTURE NO _____

METAL IN THE MOLD _____ POUNDS _____ AT _____ PER POUND _____ $ _____

GATES, SPRUES, AND REJECTS _____ POUNDS _____ AT _____ PER POUND _____

GOOD CASTINGS _____ POUNDS _____

DELIVERY COST _____

EXTRA COST _____

ESTIMATED SELLING PRICE _____

SELLING PRICE OBTAINED _____

ESTIMATED By _____ Date _____

Fig. 1—Estimate sheet is comprehensive, yet easy to use. Its importance is beyond overemphasis. The success or failure of a business can depend on it

recognizes this fact and establishes the cost per hour to operate each of these facilities, to which he adds the hourly wage of the operator or operators, thus establishing a sound and reliable basis for estimating molding costs. Provision is made on the estimate sheet for recording the results of this calculation.

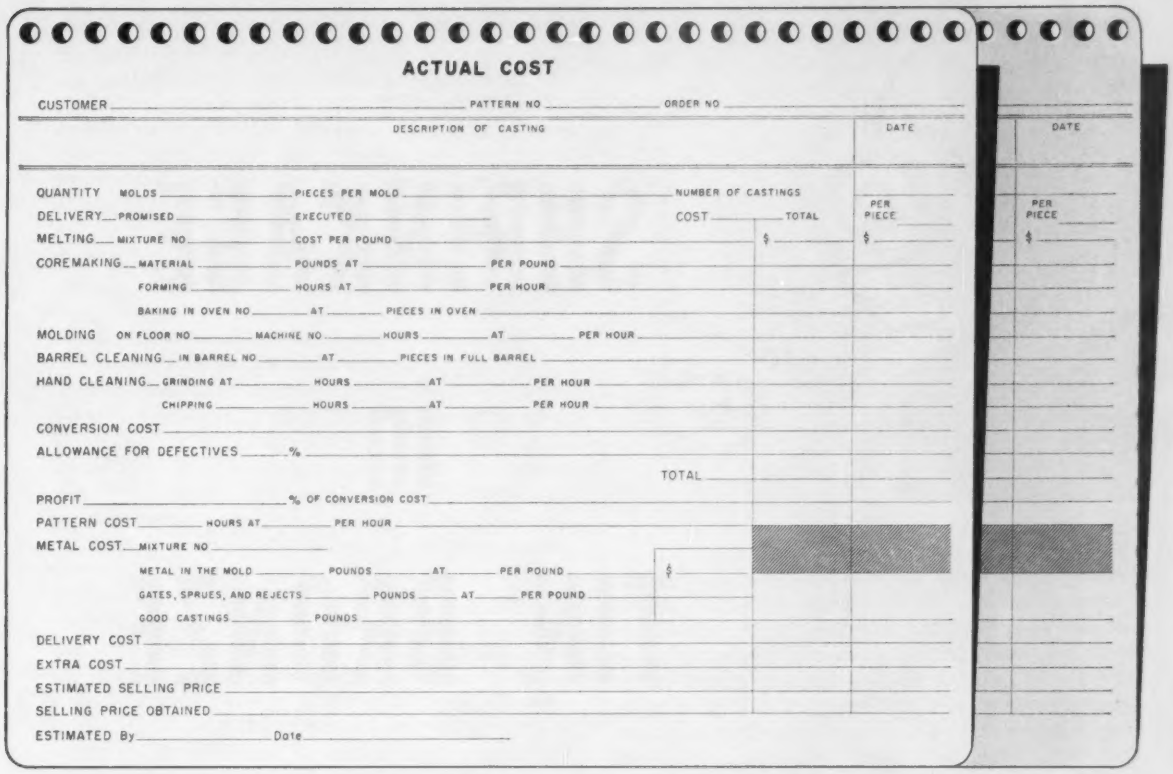
Barrel Cleaning — To estimate the cost of cleaning castings in a tumbling or airless blast barrel, first determine the hourly cost to operate the barrel; then estimate the number of castings that can be tumbled economically at one time. The time the castings are in the barrel multiplied by the hourly cost and divided by the number of castings results in the unit cost per piece. Because of the many shapes and sizes of castings produced by a jobbing gray iron foundry, estimating the cost of tumbling on the basis of weight is unreliable. Certain castings are of such a shape that they "nest" closely, thereby weighing more than other castings that do not nest so closely. Both types may require the same operating time.

Hand Cleaning—Since time is the basic factor in calculating the cost of each hand cleaning operation, the hourly operating cost of each cleaning facility is determined and the hourly wage of the operator added to it. This hourly cost is used to determine the cost of cleaning each job. When the operator is paid on a piecework or premium basis, it is necessary to make two calculations.

First multiply the number of castings cleaned by the established labor rate per piece or other quality; then multiply the hourly cost of operating the facility by the time consumed on the operation to arrive at the overhead cost. Dividing the sum of the labor and overhead costs by the number of castings cleaned results in the cost per casting. Careful analysis of the conditions incident to this type of operation shows the fallacy of calculating manual cleaning costs either on the basis of weight of castings or as a percentage of molding labor. Furthermore, lack of a continuing relationship between labor cost and operating cost of a cleaning facility shows the unreliability of allocating overhead on the basis of direct labor cost.

Conversion Cost—The purpose of a foundry is to transform metals into shapes required by customers. This operation we call "conversion"—that is, the melting, coremaking, molding, and cleaning operations. Measurement of the costs of these operations is the conversion cost, the sum of which is the conversion cost of the job. Errors in calculating the cost of any of these operations necessarily cause errors in the final result. These errors may be the result of faulty cost accounting fundamentals or mistakes in calculations. In either event, they may cause the foundryman to refuse business that he should take or to take business that he should not.

Allowance for Defectives—When an estimate is prepared, provision should be made for normal losses in production. Complexity of the casting is a predominating factor in expected losses of metals, labor, and overhead. Uniform percentages



ACTUAL COST

CUSTOMER _____ PATTERN NO _____ ORDER NO _____

DESCRIPTION OF CASTING | DATE

QUANTITY MOLDS _____ PIECES PER MOLD _____ NUMBER OF CASTINGS

DELIVERY PROMISED _____ EXECUTED _____ COST _____ TOTAL | PER PIECE

MELTING MIXTURE NO _____ COST PER POUND _____ $ | $

COREMAKING MATERIAL _____ POUNDS AT _____ PER POUND

FORMING _____ HOURS AT _____ PER HOUR

BAKING IN OVEN NO _____ AT _____ PIECES IN OVEN

MOLDING ON FLOOR NO _____ MACHINE NO _____ HOURS _____ AT _____ PER HOUR

BARREL CLEANING IN BARREL NO _____ AT _____ PIECES IN FULL BARREL

HAND CLEANING GRINDING AT _____ HOURS _____ AT _____ PER HOUR

CHIPPING _____ HOURS _____ AT _____ PER HOUR

CONVERSION COST _____

ALLOWANCE FOR DEFECTIVES _____ %

TOTAL _____

PROFIT _____ % OF CONVERSION COST _____

PATTERN COST _____ HOURS AT _____ PER HOUR _____

METAL COST MIXTURE NO _____

METAL IN THE MOLD _____ POUNDS _____ AT _____ PER POUND _____ $

GATES, SPRUES, AND REJECTS _____ POUNDS _____ AT _____ PER POUND _____

GOOD CASTINGS _____ POUNDS _____

DELIVERY COST _____

EXTRA COST _____

ESTIMATED SELLING PRICE _____

SELLING PRICE OBTAINED _____

ESTIMATED By _____ Date _____

DATE | PER PIECE | $

Fig. 2—Form for recording actual costs is a duplicate of the estimate sheet. Here it is superimposed on the estimate sheet (shaded) for ready comparison

applied to the conversion cost should not be used when making estimates. These losses cover the cost of the several operations up to the point where the loss is discovered.

Profit—Operating profit should be based on the conversion cost. Basing profit percentages on the combined costs of metal, direct labor, overhead, and selling costs does not recognize variations in metal costs of different jobs. Although the operating foundry is not engaged in buying and selling metals as a business, costs of handling metals are a proper charge to the cost of the metals and should be so treated.

Metal Cost—Provision is made on the estimating form for recording the mixture number, weight and cost of the metal in the mold, and weight and values of gates, sprues, and rejects returned to the melting department for remelt. Deducting returns from metal in the molds gives weight and cost of good castings.

Delivery Costs — This estimated cost covers transportation assumed by the foundry.

Extra Cost—This class covers charges for maintenance of the customer's pattern, coreboxes, etc. Some foundrymen may wish to provide more lines for recording costs of this nature.

After all costs have been recorded in the "Cost ——— total" column of the form, determine the unit costs for each entry and record them in the righthand column. To complete the estimate, the total and unit cost columns are added, bringing the results down to the "estimated selling price." The actual selling price is recorded at the time the order is received from the customer.

After completion of the job estimate, the estimate sheet is placed in a pending file to await receipt of the customer's order. When it has been received, the estimate sheet is removed from the pending file, the customer order number noted on the estimate sheet, and the estimate sheet placed in the active file to be used later as a comparison with the actual costs. The prepared estimate sheet often affords information that can be used to calculate the cost of another casting of a similar character.

The cost sheet recording the actual performance is a duplicate of the estimate sheet so that comparisons can be made quickly. This method of cost comparison allows management to discover irregularities in costs quickly.

Observation of cost estimating systems employed in foundries indicates that not all the good ones are used by larger foundries. Many small operators, often believed to have inadequate estimating systems, are using dependable ones. Wise management will enter competition only with a scientifically prepared estimate to be used to establish a sales policy for each item to be produced.

It is a common feeling that the market sets selling prices, and it largely does. No one, however, compels a foundryman to take business that he should not. Scientifically prepared estimates will tell him definitely when to accept and when to reject orders for production.

SHRINKAGE in TIN BRONZE

The concluding article in this series continues the discussion of sources of water vapor in melts. The author recommends a fracture test bar which can be used to determine the amount of gas present

By CLYDE L. FREAR
Foundry Engineer
Alexandria, Va.

IT HAS often been noted that more trouble is experienced with leakage in bronze castings made on rainy days than on dry days, also more in the summer than in the winter. Much of this difficulty results from the fact that everything we handle in the foundry is likely to contain more moisture on a humid day than on a dry day. Moreover, humid air blown through the burners of a melting furnace will increase the amount of moisture normally resulting from combustion of the fuel.

The cure or prevention of trouble resulting from this extra moisture is the use of greater care in drying and keeping dry everything coming into contact with the metal. Little can be done to keep this extra moisture out of the melting furnace, but its effect can be minimized or eliminated entirely by increasing the percentage of air used in the fuel mixture. This may sound peculiar at first thought, but it must be remembered that the air—even on a day of 100 per cent relative humidity—contains much less water vapor than that formed when the fuel burns. The amount of water vapor entering the burners on a day even of exceptionally high humidity will be much less than that formed in the combustion.

In conditions of highest humidity, 1 pound of air contains approximately 0.002 pounds of water vapor or 1 part of water vapor in 500 parts of air. In the propane reaction given earlier, water vapor makes up about one-tenth the volume of air. Therefore increasing the air, although increasing the water vapor content to a certain amount, will increase the oxygen in much greater proportion. Of course, melting will be somewhat slower because of the extra air and water vapor which must be heated to the combustion temperature.

Damp Crucibles or Furnace Linings—Crucibles for melting bronzes should be absolutely dry before being used. They should be stored in a warm, dry place, and when first used should be at a red heat for a sufficient time to remove all moisture before any metal is charged. If they are permitted to stand for any length of time during which

they might pick up moisture, the same procedure should be followed.

Crucibles should be as dense as practicable and preferably should retain their glaze on the outer surface as long as they are used. Products of combustion surrounding the crucible are capable of penetrating unglazed, spongy areas. The carbon of the crucible can then react with the water vapor in these furnace gases, breaking down into carbon monoxide and nascent hydrogen. The latter gas can easily pass through the spongy areas and be dissolved by the metal. This reaction will be discussed in detail later when considering the use of charcoal during melting.

In the case of reverberatory furnaces and some others where a refractory lining is used instead of a crucible, it is obvious that the lining should be absolutely dry; otherwise steam will be formed and force its way out. If a layer of molten metal is lying against the lining, the steam will have no place to go except through the bath, with consequent gas contamination of the metal. Certain things can be done, not necessarily to lessen the amount of water to be evaporated, but to insure that this water cannot enter into the metal. First, the furnace shell should have a series of small holes to permit passage of steam through the shell rather than into the furnace. In laying up the lining it is advisable to use a course of very porous brick or other material between the refractory and the shell to provide easy passage of the steam to the vent holes.

Fluxes and Covers—Use of fluxes and covers is rather general in the nonferrous foundry industry. In some cases they are necessary. In others they may offer distinct disadvantages, and under certain conditions can be actually harmful. Such materials can be divided roughly into two classes—those which provide an inactive cover and those which actually cleanse and protect the metal because of suitable chemical reactions between the flux and the melt or between the flux and the furnace atmosphere.

Probably the most widely used cover for bronze melts is molten glass, added usually in the form of broken bottles when the charge is placed in the crucible. This glass softens gradually and finally forms a rather gummy layer on the surface by the time the charge is melted. This layer is probably one of the best barriers to contaminants which might enter the bath of metal from the surrounding atmosphere by way of the metal surface. It is just as good a barrier, however, to contaminants already in the metal and which otherwise would pass off into the atmosphere. It will have no value in preventing absorption of gases through the crucible. It should never be used when oxidizing materials are added to the charge since it may prevent removal of the oxidized gases from the melt.

As long as it forms a continuous layer on the surface of the metal bath, an oxidizing flux such as copper oxide should prevent the solution of nascent hydrogen from the furnace atmosphere. It is probably impossible for free atoms of hydrogen to pass through a layer of material maintained in an oxidizing state. Being extremely active chemically, such hydrogen atoms would immediately unite with the oxygen of the flux and form steam which should pass off harmlessly. To be effective in this way, the flux must retain its oxidizing properties as long as there is water vapor above the bath, and must completely cover the bath at all times. A fluid flux would be better than a solid flocculant flux. Here again, however, the oxidizing fluxes would have no value in preventing hydrogen pickup through the crucible or from a damp furnace lining. They would have almost no value in reverberatory type furnaces, especially those in which the flame strikes the metal surface, because the force of the flame would prevent complete coverage of the metal by the flux.

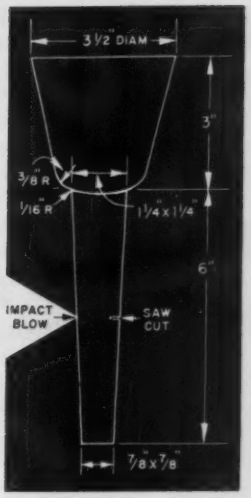


Fig. 1 — Tapered fracture test bar for the tin bronzes has oversized riser to provide for as nearly complete feeding as is possible

The above statements cover almost completely the flux requirement of copper-base alloys. Except for the use of oxidizing fluxes and those oxidizing materials added to the charge, there should be little need of such materials, nor would their use be of any special advantage. One possible danger in their use always should be kept in mind. Most of the fluxing materials are hygroscopic and tend to absorb moisture from the air, although they appear perfectly dry. If such moisture-laden fluxes are placed on the surface of molten bronze, hydrogen pickup is almost certain to occur, thereby defeating one of the purposes of the flux.

If fluxes are used, they should be dried completely at about 220° F and preferably added while still hot. They should be heated in a suitable oven, preferably one having a compartment into which products of combustion cannot penetrate (in most gas or oil-heated ovens or furnaces the products of combustion of the fuel have an opportunity to pass through the heating chamber). Since these combustion products contain a large amount of moisture, the atmosphere inside will be saturated with water vapor. If the flux is heated to 212° F or above, it will not absorb this water but absorption will increase as the temperature

falls below 212°. For this reason, the flux should be added at a temperature above that of the boiling point of water.

Charcoal, commonly used as a cover in melting bronzes, is one of the most dangerous substances which can be added to a bath of metal in the furnace or molten metal in a ladle. Usually it is added to prevent oxidation of the bath, but its mere presence will counteract the advantages of oxidizing conditions already described. It will help to reduce the oxidation of the melt, but this is the one thing we do not want to occur, at least as long as there is any hydrogen or water vapor present.

But worse than the reducing effect of the charcoal is the fact that it will actually add exceptionally large amounts of hydrogen to the metal. Charcoal, either lump or powdered, is one of the best gas-absorbing agents. It not only will absorb large amounts of water vapor while merely standing in the air, but will cause it to condense within the pores (adsorption). Consequently, the amount of water it can retain is almost as large as if the charcoal were actually dipped in water, yet it will appear perfectly dry. This water can be expelled only by comparatively long heating at a red heat. An otherwise gas-free melt of bronze can be thoroughly gassed merely by putting ordinary charcoal on the surface. It is the writer's firm belief that charcoal has no place as a cover in a bronze foundry.

Gassing is only a small part of the trouble which charcoal can introduce. Under conditions of high humidity, even perfectly dry charcoal present on the surface of molten metal in a fuel-fired or electric furnace will react with water vapor to form carbon monoxide and nascent hydrogen ($C + H_2O = CO + 2\,H$).

The charcoal will not only counteract all the advantages of the oxidizing flame—and an oxidizing flux, if one is used—but it will produce many times the amount of nascent hydrogen that could be produced by the simple dissociation of water vapor. A large proportion of nascent hydrogen will be formed at the interface of the charcoal and the metal where it can be absorbed in greatest quantities. This reaction will occur even though the charcoal has been thoroughly dried and is at a red heat; in fact, the reaction proceeds at a faster rate if the charcoal is hot.

Damp Ladle Linings—A damp ladle lining is a rich source of gas contaminants. Any water vapor evolved upon contact of the lining by hot metal generally must pass through the metal and will have little chance to be eliminated entirely before pouring. Therefore, the metal will be contaminated not only with hydrogen and metallic oxides but with steam. The only preventive is thorough drying of the lining and heating at a good red heat before the ladle is used for transfer of metal. Perforating the metal shell will help to permit moisture which may form to pass out through the shell rather than through the refractory lining.

Wood Skimmers—Some bronze foundries prefer wood skimmers for removing slag from

metal in the ladle. Here again we have a rich source of gas contaminants. All wood, regardless of how dry it appears to be, contains considerable water. Furthermore, wood as well as paper and other materials of organic origin is made up of carbohydrates, chiefly cellulose, having the general chemical formula $(C_{12}H_{10}O_5)_X$. The compounds contain hydrogen and oxygen in the proportion required to form water; when heated to temperature of the metal they decompose to form carbon and water vapor. Certain tarry materials also are formed which decompose to form water vapor. This water vapor is set free at the interface between the wood and the metal. The cure for this condition is, of course, to use only dry metal skimmers.

Ladle Additions—This practice introduces a problem which is not quite so self evident as the previous one. Ladle additions frequently are weighed out into paper bags and, as a matter of convenience, the bag is thrown into the ladle. In making additions it is probably true that the more closely packed we can keep these additions, the more effective they will be.

On the other hand, as we already have noted, paper is a cellulose product which, in burning, gives off a large amount of water vapor and hydrocarbons in the most effective location for maximum pickup of gases by the metal bath. Some may doubt that one small paper bag in a large ladle of metal would produce enough hydrogen to do any harm. Actually, an extremely small weight of hydrogen dissolved in the metal would be enough to thoroughly ruin an otherwise good heat of bronze.

Sand as a Ladle Cover—It is common practice to place sand on top of the metal in a ladle, the

Fig. 2—Photomacrograph of fractured tin bronze test bar shows dendritic axes, which become more easily visible as amount of gas present increases

purpose being to thicken the slag and thus make the slagging operation quicker and easier. Its popularity stems from its effectiveness for the purpose and from the fact that there is so much of it available in the foundry. Let us consider, however, its effect on the metal. Of course, the sand most easily available is in an adjacent pile of molding sand. This sand is placed on the metal surface, stirred in thoroughly to pick up all the slag and then is removed. It should be remembered, however, that most nonferrous heap sands contain 6 to 8 per cent water, plus about 10-15 per cent of thoroughly hydrated clay. Heat of the metal immediately evaporates this latter moisture and it, plus moisture already in the sand, will dissociate and a considerable portion of the resultant hydrogen will enter the metal. If dry sand is used, we would be somewhat better off, but molding sand that apparently is thoroughly dry contains quite a bit of moisture and has considerably more held in combination with the clay bond. The writer will not argue against the use of sand as a slag thickener, but recommends that only a clean sharp sand which has been thoroughly dried in an oven be used.

Molds—Correctly melted metal, poured into and out of a thoroughly dried ladle and not permitted to come into contact with any hydrogen-forming materials can still become charged with hydrogen and other gases when it is poured into the mold. The molding material can have considerable influence on the amount of gas picked up. Although molding methods will be considered in greater detail later, it might be well to describe briefly the action of metal in filling the mold.

For this brief consideration a simple system of down gate, runner and sprue will be used. Metal gains speed as it passes down a vertical sprue. This gain in speed (the amount of metal being kept constant by keeping the pouring cup full) causes the falling stream of metal to become smaller. Consequently unless the down gate itself becomes smaller as it passes through the mold, a space will exist between its walls and the metal stream. If the down gate is impermeable, this space becomes a vacuum. In a sand mold having a certain permeability, however, the space will be filled with air which is drawn through the mold.

If the gate or runner is purposely choked to keep the down gate full, then as the metal issues in a rapid stream from the choked-down portion, the injector effect from this "squirting" metal likewise will draw air through the mold. It is probably impossible to devise a gating system in a permeable mold which will not produce this injector effect. Also it is probably impossible to design a system of gates which does not produce some turbulence. The result of any turbulence will be to mix thoroughly any injected air with the metal stream.

If a green sand mold is being used, all air drawn into the gates by the metal stream will be saturated with water vapor, the air having passed through the green sand. The water vapor, becoming intimately mixed with the metal, will provide the conditions necessary for hydrogen pickup. There will also be a considerable pickup of oxygen as well as undissociated water vapor. All of these gases are likely to produce shrinkage gas holes and discoloration of the metal when fractured.

The use of dry sand molds will alleviate to a considerable extent the danger of hydrogen pickup from moisture injected into the metal. Although the air drawn into the gating system will be dry (except for the humidity moisture present), there will still be the danger of mixing air with the metal. This air may later show up as gas holes.

There is a further danger, however, and it also applies to cores. Dry sand molds and cores are held together with clay binders, oils, and other organic compounds, which are not removed by baking. The residual hardened oils of the cores will give up hydrocarbons which, if permitted to mix with the metal, will produce shrinkage. In baked molds the clay bond still contains hydrated compounds, and the water can be set free when the bond is heated to the temperature of the molten metal.

At least two things can be done to prevent hydrogen and gas pickup in the mold. The most evident thing is to provide complete venting of the mold so that all gases can be carried off without forming back pressure. In this way, the quantity of harmful gases may be kept sufficiently low that no harm may result, or, at least, the amount of hydrogen absorbed will be less than the limit of solid solubility in the metal.

To prevent the injector action in the gating system, the remedy is the exact opposite of that which would help in the mold cavity itself. If we can provide an absolutely impermeable gating system, whereby any tendency for a vacuum to be formed in the system would fail to draw air through the mold, all danger from this source would be eliminated. Impermeable gates can be made by applying a wash to fill the mold interstices completely, then baking this wash until it is completely dehydrated. Another, and probably better, method would be to make the gating system with impermeable ceramic tubes. These tubes would be molded in place, all junctions being cemented to produce a continuous impermeable system.

General Remarks—In the above discussion, the writer has had no desire to discourage the reader. It is true that almost every procedure used in making bronze castings has been mentioned and described as a potential source of gas shrinkage in the metal. Although the writer has experienced all of these problems—fortunately, not all of them

in any single foundry—he has produced perfectly sound bronze castings by adhering to the practices recommended. In general, it can be said that every recommendation made is really nothing but good foundry practice. Most of these recommendations can be applied without adding to the cost of the finished product. In most of those cases where the cost would be increased, it would be more than offset by the savings resulting from reduction in the number of scrapped castings.

Determination of Gas Shrinkage—Obviously, if we are to make a number of bronze valves or pumps which must be machined and which must withstand high perssures in service, it would hardly be economical to use a heat of metal which is known to contain a large amount of hydrogen and which would be certain to produce leakers. To repeat, regardless of the care taken to provide complete directional solidification in the mold, the feeding provided will be defeated if sufficient hydrogen is dissolved in the metal to permit the gas to come out of solution at the instant that each particle of metal solidifies.

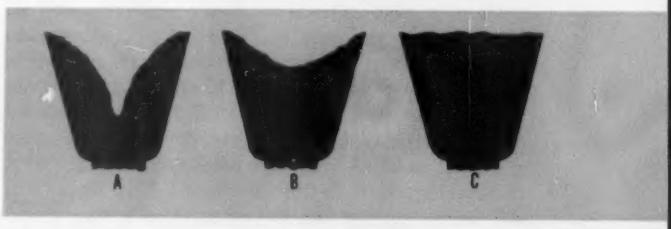
Although there are a number of ways to determine the presence of gas, the method must be rapid, it should be capable of being used in the foundry, preferably at the furnace, and it must be capable of easy but certain interpretation. The one which best meets all of the requirements is probably the fracture test; when conducted and interpreted correctly, it probably gives all necessary information as to the soundness of the metal, at least while it is in the furnace. If the metal has the desired quality at this point, all subsequent operations can be kept completely under control, as far as gassing of the heat is concerned.

Although fracture tests have been made for years, there have been special tests described, one conducted at the University of Michigan,[6] and one at MIT.[7] Both of these tests provide for casting a bar in a chill mold. The only criticism which the writer has of these tests is that by using a chill, the metal may cool sufficiently fast that a fine grain structure results and the metal may possibly be supercooled. With such supercooling, a greater amount of hydrogen may remain in solid solution than in the case of ordinary slow cooling in the mold. This factor, plus the fine grain structure obtained, may obscure the effects due to gas.

To permit the maximum separation of dissolved gas, the author prefers a bar cooled naturally in a sand mold, preferably dry sand or core, of such shape that complete feeding can be obtained. For laboratory work, a keel bar type of casting would be preferable, but since this would require too long a time to remove the test bars before fracturing, he has resorted to the bar shown in Fig. 1. This bar has a taper and an oversized riser to provide complete feeding, if this is possible, so that shrinkage due to gas is not obscured by that caused by lack of feed. The casting is top poured into a simple core. The metal, preferably removed from the bath by means of a suitable small hand ladle, should be treated immediately with a slight excess of phosphor-copper to obtain complete deoxidation. If oxygen is present in the metal, its effect will mask that of the hydrogen.

Solidification of the tapered body is complete in a very short time, but the casting should be left in the mold until it is strong enough to withstand handling with tongs without crushing or breaking. When the casting is capable of being handled, it is removed from the mold and cooled in water. A notch is cut across one side at the middle of the casting with a hacksaw or a cut-off wheel, and the casting broken in a vise or under a press. The fracture should be examined at a magnification of five to ten diameters. A good hand lens is suitable, but a wide field binocular microscope is better.

Interpretation of the Fracture—With a little study and experience, interpretation of the fracture should be rather simple and quick. First, it must be realized that the fracture of a sound tin bronze casting will not have the color of a machined or cast bronze surface. The fracture will show a finely granular surface with no indication of dendrites or grain boundaries. It will have a bluish gray tinge, yet still seem to have indications of the yellow bronze color. Unfortunately, the color is almost impossible to define, and seems just as difficult to photograph correctly in color. The knowledge of the right color therefore must come from experience.



If the fracture is reddish or brownish yellow, usually in the center, deoxidation has not been complete. On the other hand, if there are a number of very fine, smooth-walled holes having canary yellow walls, these holes are caused by hydrogen. Comparatively large amounts of hydrogen may produce a completely yellow fracture.

Although much can be determined by the color of the fracture, especially after the necessary experience has been attained, the one real, irrefutable test for gas is the presence of sharply defined dendrites on the fractured surface. A perfectly sound, gas-free bronze will not show a single dendrite or dendritic branch but will be entirely granular and will have a rough matte appearance to the naked eye.

A little thought will show the reason for this condition. Normally, the dendrites would grow in the molten liquid and, finally, the spaces between the dendrites and dendritic branches would become completely filled because of liquid feed metal being forced into the interstices. The completed dendrites would form solid grains, the boundaries of which would have little or no resemblance to a pine tree

structure. In almost any perfectly sound, fine-grained metal, the grain boundaries are stronger than the grains themselves. Therefore, when a piece of sound metal is broken it breaks across the grains instead of around them, and there would be no reason to expect a visible dendritic structure appearing on the fractured surface.

On the other hand, if gas is expelled on solidification, this gas prevents feed metal from flowing between the dendritic branches. When the source of feed metal is shut off from a dendrite it naturally stops growing, leaving all the sharpness of the dendritic pattern. Since there is little or no metal between the dendrites, the casting will break around and between them and leave exposed the branches, the primary axes, even the secondary and sometimes the tertiary axes. Often whole dendrites are exposed, each of them showing the sharp axes which have failed to fill out.

Fig. 2 is a photomacrograph of one of the test bars shown in Fig. 1 taken under oblique illumination at 12 diameters magnification. The dendritic axes apparent in each grain could easily be seen by means of a 5-diameter hand lens. Although the individual grains are broken straight across in the present case, it is more usual for them to fracture at varying angles. The present case was chosen as it was the only one available which could be photographed with several grains in focus.

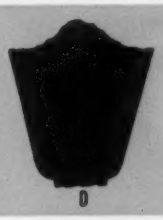


Fig. 3—Effects of dissolved gas on shrinkage of tin bronze risers: A—Deep pipe, no gas. B—Shallow indentation, slight gas. C—No indentation, heavy gas. D—Metal rising. Heavy gas, with purging probable

It will be noted that there is a considerable tendency for the metal to tear near the grain boundaries—an almost universal condition when the metal is discontinuous because of shrinkage cavities. Usually, the more shrinkage there is present, the greater will be the tendency to tear and produce an uneven fractured surface.

The number of dendritic axes to be seen on the fractured surface will vary with the amount of gas. With large gas evolution during solidification, the spaces between the individual axes may fail to be filled out and the primary, secondary, and even tertiary axes may be visible.

The fracture test is just as useful in testing a bad casting as it is for testing a heat in the furnace. If, instead of the dendrites showing the extreme sharpness of the dendritic axes, these axes are somewhat smoothed off and are interspersed with truly granular areas, lack of feed is indicated, but this lack of feed generally is due to shrinkage only, not to gas. In examining a fractured casting, the color of the freshly made fracture will give an indication of the conditions of the metal at the time of pouring. The casting fractures can range all the way from bluish-gray granular breaks, indicating sound, gas-free metal; through lemon yellow, usually showing rounded holes and dendrites caused by hydrogen alone; thence to a brownish color, indicating the precence of a small amount of oxygen and probably accompanied by fairly large amounts of hydrogen. A dark brown or black woody appearing fracture indicates strongly oxidizing conditions in addition to other possibilities which are impossible to determine from an examination of the fracture alone.

A black or dark brown fracture should not occur in a test bar unless excessive oxidizing conditions are present and deoxidation has been incomplete. If a dark fracture is obtained, a new test should be taken, using increased deoxidation with phosphor-copper or other suitable deoxidizer until subsequent tests indicate that oxidizing conditions have been removed. It is only after such complete deoxidation that a correct and complete interpretation of the fracture in the test bar can be made in so far as presence of hydrogen is concerned. The amount of deoxidation required in the test bar will serve as a rough indication of the amount required for the whole melt.

There is one other indication in the test bar which should give the operator a good idea as to the amount of gas present, this being the amount of "pull down" in the riser. With a gas-free metal, the piping or "pull down" in the riser will be approximately as shown in Fig. 3 (a). With light gassing, just enough to prevent complete feeding, the riser surface will appear as shown in Fig. 3(b). Fig. 3 (c) and (d) indicate what will happen with cases of heavily gassed metal

Conclusion—In the foregoing the author has dwelt at considerable length on the effect and the elimination and prevention of dissolved gases. There has been some repetition in order to emphasize the fact that it is useless to expect a tin bronze to feed completely when gas is present.

The author has known of cases where foundries have dispensed with risers when they indicated that no feeding existed and appeared to be a waste of metal. Whether the risers "draw down" or not, the metal has the same liquid-to-solid shrinkage. If this shrinkage does not occur in the risers, then it is an absolute certainty that it is present in the casting in the form of gas holes, massive shrinkage, or spread throughout in the form of interdendritic shrinkage. In other words, if the risers don't "draw down" the shrinkage is in the casting. Nonfeeding of risers should be a sign that something drastic in metal correction should be started.

With but few exceptions, any correctly designed casting can be made completely sound if it is scientifically risered for complete feeding and the metal poured into the mold is itself capable of feeding.

REFERENCES

6. "Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass," Baker, Upthegrove and Rote, *Transactions*, AFS, 1950, p. 122.
7. "Simple Fracture Test for Melt Quality of Bronze Castings," Howard F. Taylor and James O'Keefe Jr., FOUNDRY, February, 1950, p. 94.

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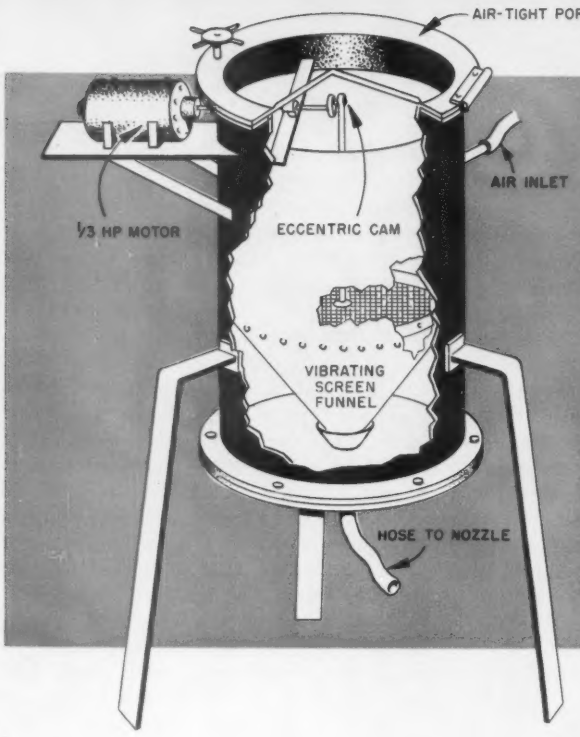

Fig. 1—Sand spraying machine

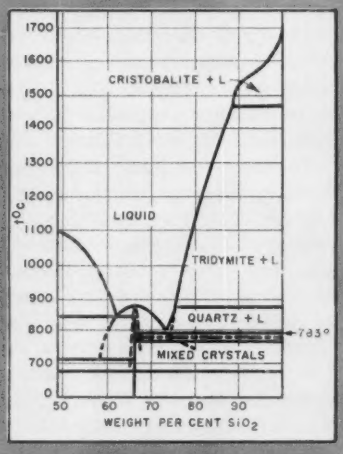

Fig. 2—Phase equilibrium diagram of the binary system $Na_2O \cdot SiO_2$[4]

SODIUM—SILICATE BONDED

Success and widespread use of the shell molding process have led to experiments concerning the use of sodium silicate, or waterglass, as a possible substitute for resin. Here are the results

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SUBSEQUENT to World War II, the development and employment of the resin-bonded shell molding process for the manufacture of small and medium-sized castings was a major foundry technological advancement contributing significantly to the quality and uniformity of cast products. Economy of the process for high-quantity production of complex castings, compared with conventional methods of manufacture, is evidenced by its widespread adoption by American industry.[1]

In line with the mission to investigate possible industrial processes for the manufacture of Ordnance materials, a modest program was initiated to explore the possibility of using inexpensive inorganic binders instead of resin as a bonding agent in the manufacture of shell molds. Sponsored industrial research conducted at Massachusetts Institute of Technology found sodium silicate[2, 3] (waterglass) to hold promise as a possible substitute for resin. Accordingly, additional investigations of the substitution of liquid waterglass for resin subsequently was initiated at the arsenal.

It was soon apparent that the necessity of employing a wet mix with inherently poor flowability precluded the use of such conventional shell mold equipment as dump boxes and core blowers. Instead, it was decided to spray the wet sand onto a pattern plate, and a special machine to do this was built. Although experimental in nature, the sand-spraying equipment was constructed with eventual production requirements in mind.

Similar to Core Blower—The sand spray machine is a vibrating basket-screen-funnel assembly inside a pressure tank (Fig. 1). Operation is similar in principle to that of a core blower in that the sand is aerated and introduced into an air stream. Specifically, the sand mix is vibrated through the screen into the funnel at a rate controlled by the mesh size of the screen and the amplitude and frequency of the basket's vibrations. After entering the funnel, the aerated sand is picked up by the air stream and moved through

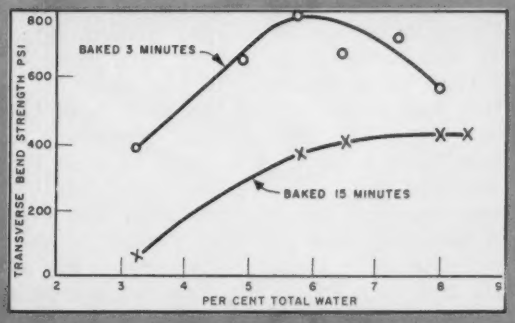


Fig. 3—Transverse strength vs total water content

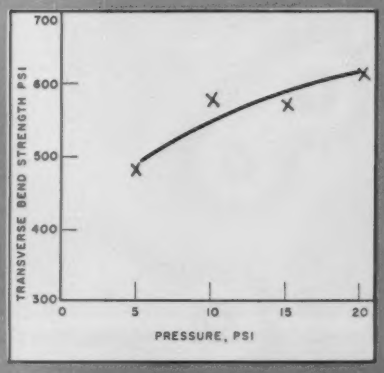
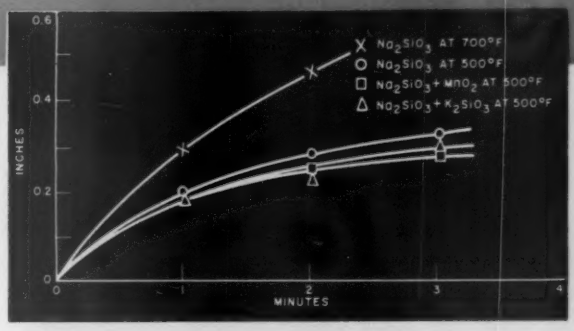


Fig. 4 — Transverse strength versus air pressure

Fig. 5—Rate of setting: Sand-waterglass mixtures at various temperatures with different additives[3]



SHELL MOLDS

the plastic hose to the nozzle of the unit.

In making shells, the cylindrical container is filled with sand, the tank is sealed and pressurized to 12 psi, and vibration is started. The operator then manually directs the sand stream onto a 12 x 18-in. matchplate, which has been preheated to 500° F and conditioned with suitable release agents. Within 15 seconds, a sand coating approximately ¼ in. thick is developed on the entire surface of the matchplate. The matchplate and uncured shell half are placed in a 900° F oven for 1 to 3 minutes. The actual baking time is dependent on shell thickness. The matchplate is moved to the ejection station of the shell mold machine where the cured shell half is released and then bonded to its mating half. At present, shell halves are bolted together and packed in steel shot prior to the pour. Undoubtedly more economical methods of assembling shell halves can be developed.

A number of variables must be considered in the development of an optimum sand mix for these molds. To date, thought has been given to sand fineness, quantity and type of waterglass, and moisture content of the sand mix; these factors influence the flowability of the sand mix, and the surface finish, collapsibility, and strength of the cured mold. The major effort, however, has been directed toward developing a sand mix with a baked strength capable of withstanding ejection, bonding, and hydrostatic pressures after pouring.

A washed, screened, and dried New Jersey 120 AFS grain-fineness sand used in production of conventional shell molds was selected for this study. Casting surface finish could then be compared with the finish of castings from resin-bonded molds.

A survey of the 17 commercially available grades of waterglass indicated that best results would be obtained if the silica-to-soda ratio of the glass was as high as possible. Thus, a waterglass with a ratio of 1:3.75, containing 6.75 per cent soda (Na_2O) and 25.3 per cent silica (SiO_2), was selected. The logic of this choice is apparent from study of Fig. 2, the phase diagram for the soda-silica system.[4] Commercial grades of waterglass have a range of 60 to 80 per cent silica. Since each grain of sand is surrounded by a sodium-silicate film, and since this film is subjected to a high temperature during the pour, the waterglass with the low soda content is most effective in minimizing the reduction in the refractoriness of the shell mold. In spite of the low soda content in the mix, some sintering tends to occur above 1440° F (783° C), the eutectic temperature of the soda-silica system.

Effect of Water Content—It was anticipated that the total water content (water in the waterglass plus added water) would affect the strength of the baked shell mold, because water is the ve-

Fig. 6, 7, 8, and 9 (from top to bottom)—Typical sodium-silicate bonded shell mold halves for, respectively, ring and cover, cap, bracket, and plate casting

hicle by which the sand surfaces are coated with sodium-silicate film. A study was made of the effect of water content on mold strength (Fig. 3) by manufacturing shell molds from mixes with varying water contents. In this study the pattern was at 500° F, and the shells were baked in a 900° F oven for 3 minutes. Transverse bend bars, ¼ in. thick and 1 in. wide, were cut out of the cured shells and tested on a 3-in. span to obtain transverse strength (maximum fiber stress). A maximum transverse bend strength of 800 psi was obtained in a 5 per cent waterglass mix when the total water (water in the waterglass and added water) is 5.75 per cent. This is equivalent to a mix of 5 per cent waterglass and 2½ per cent additional water.

The same experiment outlined above was repeated, but here the test specimens underwent additional baking for 12 minutes at 500° F. These results are shown in the second curve of Fig. 3. The decrease in strength between the first and second curve is attributed to the loss of additional water during prolonged baking, because water of crystallization may contribute to the strength of a silicate-bonded shell mold.

Mold strength is also influenced by the sand velocity upon impact with the pattern. High tank air pressures and resulting high sand velocities yield dense, well packed, strong molds, as is indicated in Fig. 4 where transverse bend strength is plotted against tank pressure. The experiment was performed with a low-water-content mix. Other mixes would furnish additional curves, but with the same characteristics as the one shown. Although strength increases with pressure, the practical upper limit for the spray system is 12 psi, since a high sand velocity causes the particles to bounce upon contact with the matchplate, resulting in poor mold definition and excessive sand waste.

Baking time for the molds is a function of mold thickness, matchplate temperature, oven temperature, and moisture content of the mix. Holding the latter three variables constant, the baking time will be proportional to the square of the mold thickness.[5] This was confirmed in the initial experimental work[2] by developing baking time-mold thickness curves, which are reproduced in Fig. 5. From economic considerations, it is obviously desirable to manufacture shells as thin as possible compatible with strength requirements.

The preliminary work outlined above developed a practical understanding of the sodium silicate bond, its strength limitations and processing characteristics. It generated sufficient confidence in the technique to justify the casting of metal into these molds.

Casting Work—Shell halves were manufactured on four matchplates where patterns were simple geometrical shapes that presented a minimum of mold making and casting problems. Mold manufacture was in accordance with outlined procedures wherein a sand mix of 5 per cent waterglass, 2½ per cent H_2O was sprayed onto a 500° F pattern. After curing in the 900° F oven for 3 min-

utes, the shell halves were ejected, bolted together to form a mold and packed in shot prior to the pour. Both low-carbon steel and Al-356 alloy castings were made. After shakeout, gates were removed and the steel castings were shot blasted while the aluminum castings were grit blasted. Throughout the manufacturing operation, visual inspection of molds and castings was conducted and certain quantitative measurements were taken to assess crucial aspects of the technique.

1. Photos of typical shell mold halves appear in Fig. 6 to 9. Over-all surface quality is good, although further improvements can be made by development of manufacturing techniques that would result in more uniform registration between the sand mix and the matchplate surface. Present molding procedure is apt to produce defects in the mold surface as shown in the lower left corner of Fig. 9. Work is currently directed toward eliminating this imperfection.

2. Examination of molds stored over an extended period of time indicates that deterioration of the silicate bond occurs. This is especially true at exposed corners where the surface becomes friable and loses strength. Mold storage can be successful if shell halves have been bonded together and the sprue opening has been covered so that moisture from the atmosphere is prevented from entering the mold cavity.

3. Casting shakeout and cleaning proved to be simple operations. The selection of the waterglass binder with the low soda content minimized sintering and the sticking of sand to the castings commonly associated with the sodium silicate binder.

4. Castings are a faithful reproduction of the mold cavity, as shown in Fig. 10 to 14. Steel castings are free of the pitted surface associated with shell molding. Surface finish is comparable with that of sand castings manufactured in a 120 grain fineness sand mold. Actual profilometer readings averaged 120 rms on aluminum castings and steel castings were slightly rougher at 250 rms.

5. Manufacturing time for a mold is comparable with that for conventional shell molding methods, and a considerable saving can be realized through the use of the waterglass binder.

Silicate-bonded shell molds and good castings were produced, but there are still many opportunities for further experimentation. For example, work is being done on the effect of wetting agents on the sand mix, possible alternate manufacturing procedures, and design of equipment that will improve the over-all operating performance of the technique.

REFERENCES

1. "Shell Molding Process Development at Watertown Arsenal for the Period 1951-1954 Inclusive," J. F. Wallace, G. J. Snyder, Rodman Process Laboratory Report Nr. RPL-1.
2. "Inorganic Binders Solve Shell Molding Problems," J. Navarro, H. F. Taylor, *Transactions*, AFS, Vol. 64, 1956, pp. 625-635.
3. *Soluble Silicates*, J. G. Vail, Vol. 1, 2, Reinhold Publishing Co., New York, 1952.
4. *Properties of Glass*, G. W. Morey, Reinhold Publishing Co., New York, 1954.
5. *Heat Transmission*, W. H. McAdams, McGraw-Hill Book Co., New York, 1942, p. 33.

Editor's Note: This paper also was given before the 1957 T & O Conference of the Steel Founders' Society of America.

Fig. 10, 11, 12, 13, and 14 (top to bottom) —Steel ring and cover castings, aluminum ring and cover castings, aluminum and steel caps, steel bracket, aluminum plate casting

Manufacture and Use of Large

Fig. 2—Outboard motors use many diecastings to achieve favorable ratio of weight to horsepower

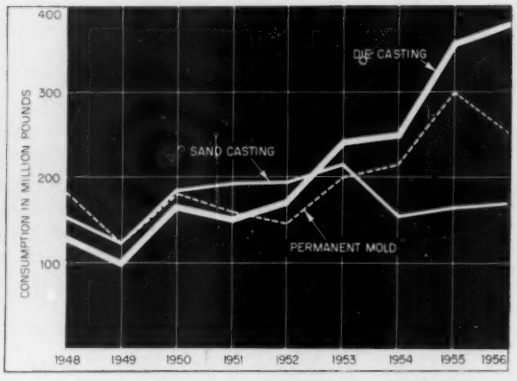


Fig. 3—Aluminum diecasting production has topped sand, that of permanent mold

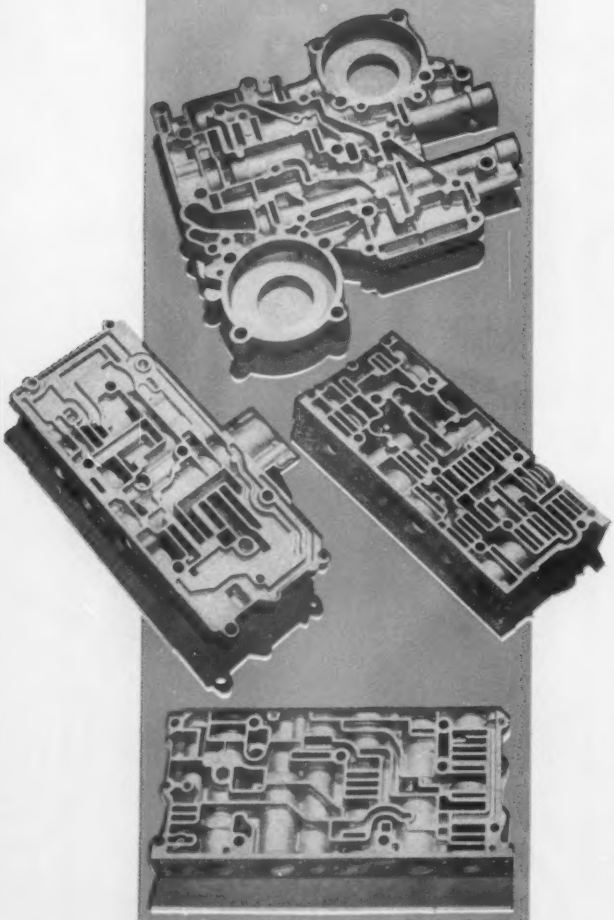


Fig. 1—A few intricate, close-tolerance, diecast valve bodies

THE era in which we live often is described as the "age of automation." Others call it the "light metal age." Both phrases describe mankind's everlasting desire and endless efforts to produce more and better goods at lower weights and decreased costs.

The diecasting process was born a century ago to produce better castings faster and cheaper than before. While first confined to tin, lead, and zinc, the process expanded into aluminum some 50 years ago. Ever since, aluminum diecasting has grown by leaps and bounds because its basic characteristics give impetus toward automation and light weight.

Technological progress in aluminum diecasting has been unusually rapid since the introduction of the cold chamber machine some 25 years ago. Higher locking and injection pressures with improved electrical controls for time cycle and temperature have improved the quality and the soundness of diecastings. Faster cycles, semiautomatic, and automatic operations have decreased manufacturing costs. Larger diecasting machines have opened new fields of application.

Progress in Alloys and Dies—Improvements in alloys and advancements in design and construction of dies led the way toward castings of high quality. Aluminum diecastings of intricate shape, absolute pressure tightness, and rigid dimensional tolerances are quite common today. Larger aluminum diecastings with less severe quality requirements also have shown a remarkable growth in recent years, as the outboard motor castings shown in Fig. 2.

In 1951, a big step was taken by the industry into the field of large structural parts with the manufacture of clutch and torque converter housings

Aluminum Diecastings

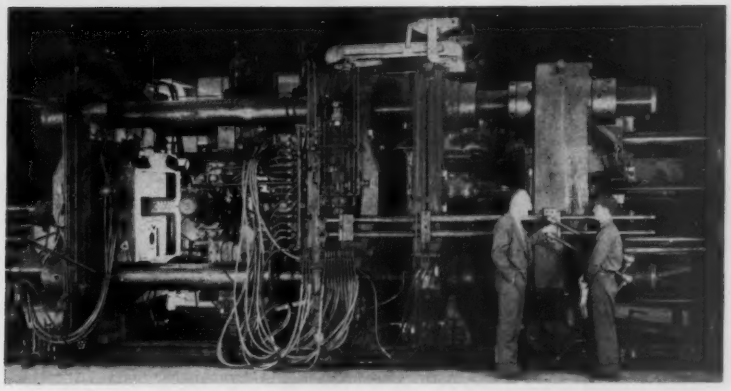


Fig. 4—World's largest diecasting machine can produce aluminum castings weighing up to 75 lb

Aluminum diecasting has made unusually rapid technological progress in recent years. In this report, condensed from a paper presented at the Second International Die Casting Conference, Mr. Bauer surveys the present status of the industry and takes a look at the future

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of aluminum. Tests of these parts proved that properly designed aluminum diecastings can well stand heavy static and dynamic stresses at overall manufacturing costs substantially lower than other processes. Today, all clutch and torque converter housings are either produced in or designed for aluminum diecasting.

These large clutch and torque converter housings gave the diecasting industry new impetus toward faster growth and the courage to expand into still larger castings. Aluminum diecasting increased to a point where it surpassed the permanent mold and sand casting production totals. In 1956, for the first time, aluminum diecasting production surpassed the combined tonnage of aluminum sand and permanent mold castings (Fig. 3).

Large diecasting machines were developed and by 1954, Doehler-Jarvis had engineered a machine with a locking pressure of 2000 tons capable of diecasting aluminum parts up to 75 lb (Fig. 4). The development of a 6-cylinder engine block followed, and the 43-lb aluminum blocks (Fig. 5) are the largest aluminum diecastings produced to date. The 6-cylinder engine design appears to be obsolete, and present engineering effort is being spent on development of an 8-cylinder V-8 engine block to be diecast in aluminum.

Two sections of wooden models of proposed diecast V-8 engine blocks are shown in Fig. 6. Undercuts have been eliminated and heavy sections avoided. As the parts are designed, they do not present unusual diecasting problems. Estimated weight of these V-8 engine blocks is 55 to 65 lb and they can be produced on the 2000-ton machine.

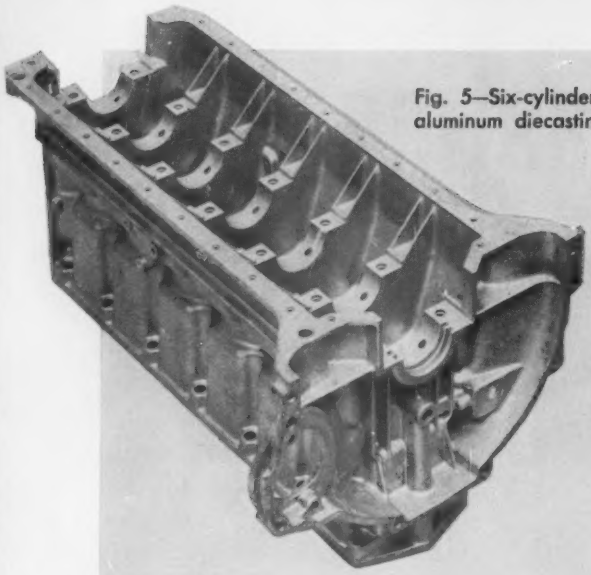
Several Years Away—Experience indicates that it will take at least three or four years before the first V-8 diecast aluminum engine will make its appearance. Design work on both the engine and the die to cast it, and prolonged field testing, are essential before the engine is perfected. The biggest achievement of the engine block development is that it proved there is hardly a limit to the size of aluminum diecastings and that aluminum diecastings can be produced at an extremely high quality level.

Another large part is an automotive transmission housing weighing 13½ lb and produced at a rate of 50 shots per hour. This is a difficult casting to make because of its large and long core pull and soundness requirements. All holes are held to close tolerances and machine stock minimized. Wall thicknesses are reduced to 0.150 in. to take full advantage of the high fatigue strength of aluminum.

Equipment manufacturers have been building diecasting machines of the order of 1000 and 1250 ton locking pressures. Today at least ten of these large units are erected and nearly all of them are in actual production. Many more and heavier ones are on order and under construction.

The machines follow in their basic design features the horizontal chamber machines with mechanical locking devices as toggle links and wedge lock systems. The direct hydraulic locking system with intensifiers has not kept pace with increased locking pressures and has not been used on machines beyond 800 tons.

On small and medium sized diecasting machines, it has been found difficult to imitate and replace by mechanical means the smooth motions of hand and arm of an operator during the ladling process. For large castings of 15 lb or more, ladling by hand becomes a serious fatigue problem. Sev-



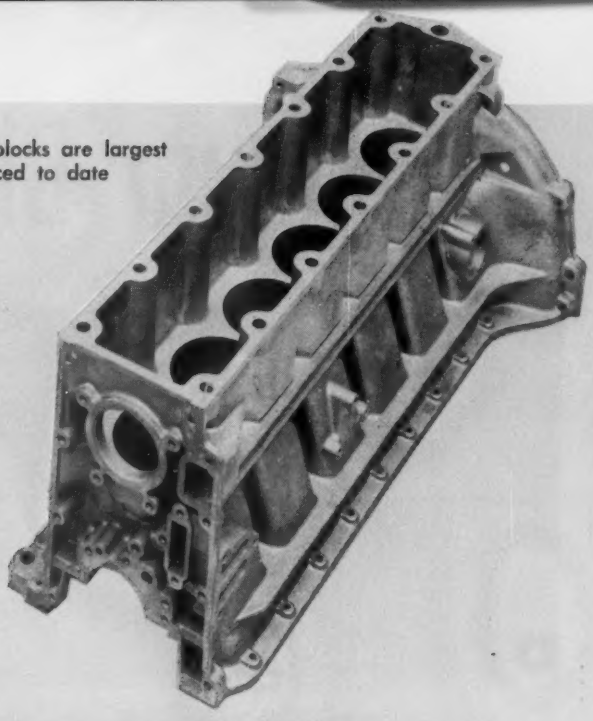
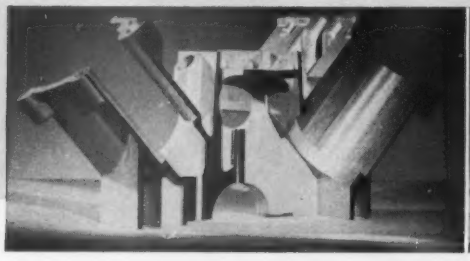
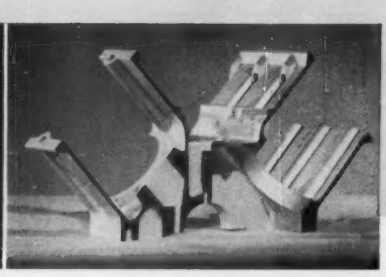


Fig. 5—Six-cylinder engine blocks are largest aluminum diecastings produced to date

Fig. 6—Wooden models of proposed V-8 aluminum engine blocks indicate the designs are far advanced





eral automatic pouring devices have been perfected and are working satisfactorily in production.

The automatic pouring ladle shown in Fig. 8 is actually a small holding furnace electrically heated and temperature controlled with a metal content larger than that of the maximum shot. When the die is closed, a contact switch starts tilting the ladle. Amount of metal poured is controlled by angle of tilting and a timer. When the ladle turns back, a switch initiates the injection of the metal into the die. This system has worked in the production of engine blocks. A 60-lb charge of molten aluminum can be measured and discharged from this ladle in 7 seconds.

Problems Are Similar—Generally, the design features and problems on large diecasting dies are the same as on smaller dies but with handling, maintenance, breakdowns, and corrections being more time consuming and costly. Gating and venting are more difficult and shrinkage variations affect large castings more than small ones. The preparatory work in determining tolerances, machine stock, taper, and core pulls has to be more thorough.

The cover die for the 6-cylinder engine block is 12½ in. thick and weighs 8 ton. The ejector half is 22 in. thick and weighs 16 ton. Total weight of the die, with ejector system and core pull, is 30 ton. Over-all measurements are 42 x 145 x 146 in. Twelve months' time and 14,000 diemaker hours went into the building of the die.

Large dies are designed for set-in impressions in large holding blocks of cast steel. A hot-work steel, SAE-H 13, with an approximate composition of 5 per cent Cr, 1 per cent Si, 1 per cent Va, and 1 per cent Mo, has worked satisfactorily.

While initial tooling costs are increased in making many small pieces instead of one large piece, there are other compensating advantages. An impression split into a number of smaller blocks reduces stresses which develop from temperature differentials in various parts of the block. On the other hand, watercooling of the many smaller parts is difficult but is handled through a manifold system with water hoses attached permanently.

Rockwell hardness of large die blocks is reduced to 42 C Rockwell to keep cleavage cracks minimized. Smaller pieces are held between 44 C and 47 C Rockwell. Excessive warpage in heat treating may be overcome by annealing the blocks at 1400° F for one hour for each inch of thickness after rough machining the cavity. The blocks are heat treated in controlled atmosphere and quenched to 50 C Rockwell and then tempered to 42 C. Normal warpage in die blocks should not exceed 0.0003 in. per in.

On large castings, careful attention must be

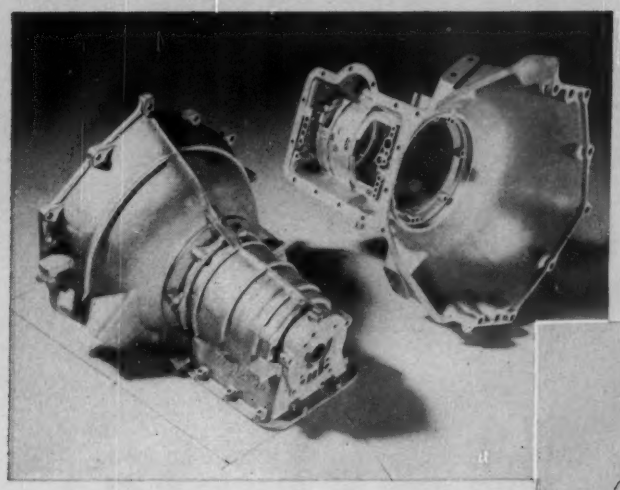


Fig. 7—Highly stressed, pressure-tight transmission housing in which all holes are cored. Weight — 13½ lb

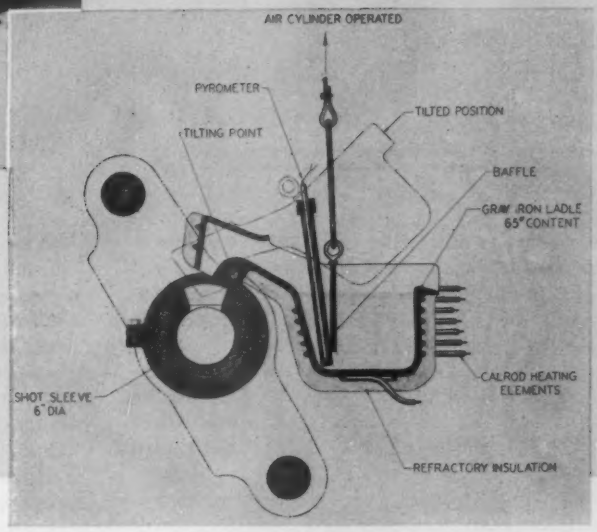


Fig. 8—Automatic pouring ladle for large diecastings is electrically heated and temperature controlled

given to the basic parting line, gating and venting, core pulls, and flash control. A cathode-ray oscilloscope is used widely to study injection conditions and filling time. In a well-designed die, the flash surrounding the parting line and slides is considered a part of the castng and must come out of the die with the casting at each ejection.

Planning Is Important—The degree of success of large diecastings depends strongly upon the preliminary planning that takes place between the customer and the diecaster in the design of the part and the die to cast it. The design should be workable so that the part can be cast with conventional production methods, at tolerances which can be held, with tapers large enough to release the casting without distortion, with cores strong enough to stand prolonged production, and with suitable walls to guarantee economical, fast production of a high-quality casting.

In spite of tremendous advances in diecasting technology in recent years, aluminum diecastings still contain a certain amount of porosity and show flow line patterns on their surface—characteristics inherent to the nature of the process with its high pressure injection and rapid chilling of the metal. The dense outside skin produces excellent fatigue characteristics and has the ability to hold pressure and prevent leakage if machined to a reasonable depth. These dense outside layers make the castings pressure-tight against oil, water, or gas, even when half the thickness is removed.

High injection pressures produce dense, strong castings. The power steering housing (Fig. 9) will withstand 1100 psi internal oil pressure and high stress load in all sections. Rejects on this casting are less than 3 per cent. Its heavy sections are accomplished through injection pressures of 6500 psi and through use of a shot control system. On some castings being produced today, injection pressures are as high as 20,000 psi.

As higher injection pressures require heavier machines and larger dies, it is reasonable to suggest that the larger machines be applied only where casting quality requires it. Present commercial aluminum diecastings in the United States are produced with injection pressures between 3000 and 10,000 psi, with the largest portion of them using pressures close to 5000 psi.

Vacuum diecasting in aluminum cold chamber machines presently is the subject of considerable experimentation and development. Progress is being made and it can be assumed that vacuum equipment for aluminum cold chamber machines will be available and will operate satisfactorily.

Various Alloys Available—Several aluminum casting alloys are available to meet varying requirements, and the six most common are listed

Comparative Characteristics of Aluminum Die Casting Alloys

Doehler Alloy No.	ASTM No.	Commercial Designation	Approx. Melting Range ° F.	Tensile Strength, psi	Yield Strength, psi	Elongation %	Die Filling Capacity	Resistance to Hot Cracking	Resistance to Cracking on Trimming	Die Cast Finish	Anti-Soldering to Die	Pressure Tightness	Machinability	Polishing	Corrosion Resistance
81	812A	13	1065 to 1080	39,000	21,000	2.0	1	1	2	4	2	1	4	4	3
89	SC84A	380	1000 to 1100	42,000	21,000	3.0	2	2	2	2	1	3*	2	2	4
810	SG100A	360	1035 to 1105	41,000	23,000	5.0	2	1	2	3	3	1	3	2	2
812	SC114A	384	960 to 1080	46,000	27,000	1.0	1	2	3**	1	1	3	2	3	4
218	G8A	218	995 to 1150	45,000	27,000	8.0	4	5	1	3	5	5	1	1	1
85	S5C	43	1065 to 1170	30,000	16,000	9.0	3	3	1	5	4	4	4	5	3

*Primary 89 alloy will give better pressure tightness than secondary 89.
**Primary 812 has less tendency to crack on trimming or straightening than secondary 812.

in the accompanying table. Various characteristics are rated from 1 to 5. Number 1 is best and number 5 is the poorest. The spread varies considerably. The alloys are rated to point out the best features of each so that when making an alloy selection the diecaster can balance the desired characteristics with the diecasting properties of the alloy. The alloys have been standardized by the ASTM and in the M-Series of the Product Standards of the American Die Casting Institute.

For alloying purposes and to check the composition of different aluminum alloys, spectrographic equipment is widely used in diecasting plants. Its real value lies in the speed with which metal analyses can be made so that any troubles in the alloy can be detected quickly and corrected before castings are produced.

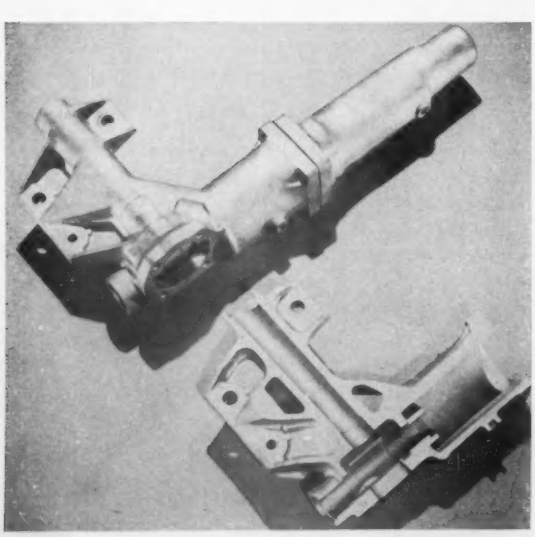


Fig. 9—High injection pressures produce dense, strong castings. This power steering housing will withstand 1100 psi internal oil pressure

Automatic control of metal temperature in melting and holding furnaces also is common today in modern plants. The temperature of dies for small and medium sized castings generally is left to the judgment of the operator. In large dies a temperature difference between major die components has a serious effect on die function and casting quality.

Built-in thermocouples customarily are used in extremely large dies and cores to check and record temperatures. Contact or pocket pyrometers are used for areas where built-in equipment cannot be installed.

Development and experimental work is under way to create equipment to provide completely automatic control temperature systems for dies. The problems are many and varied and considerable progress has been made.

Quality Control Necessary—Because of the variables in the diecasting process, the quality of aluminum diecastings must be checked regularly. Radiographic inspection is an excellent method to determine casting quality and help control casting soundness during production. X-ray control also is widely used as an aid in gating and venting of dies.

The continued improvement of diecasting equipment, development of skilled technical know-how, and ability to offer competitive prices for small castings as well as large structural parts, have been vital factors in the growth of diecasting in America and its acceptance by the automotive industry—today's largest consumer of aluminum diecastings.

Indications are that the automotive industry will increase its use of aluminum diecastings considerably. New applications for diecastings in office machines, household appliances, electric motors, air conditioners, compressors, television, etc., will add further to the importance of aluminum diecastings in American industry.

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Surface Finish of Steel Castings

The second article in this series discusses sand fineness and grading, binder content, compaction, sintering, and various dressings

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Foundry Services Ltd.
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IT IS common knowledge that use of finer sand improves the surface finish of a casting. Experimental work by Hoar and Houseman[9, 18] has shown that the penetrating pressure for a well rammed sand is inversely proportional to its modal grain size (Fig. 8). Essentially, modal grain size is that which occurs most frequently in a given sand. It can be seen that the proportionality is good for tin at 1200° F with the finer sand, where sintering effects are negligible, but there is a departure from a linear relationship for iron at 2910° F with the finer sands, where sintering is greater.

The proportionality of penetrating pressure and the reciprocal of modal or mean grain size is to be expected since the modal grain size is likely to be proportional to the effective pore radius because of simple geometrical considerations.[9] Thus Fig. 9 shows an idealized pore formed by three spherical sand grains. Since molten metals make large contact angles with silica, the penetrating metal is unlikely to spread initially into the sharp constrictions of the pore. A fair approximation of the effective pore of the idealized sand compact is given by the colored circle shown in Fig. 9. For a pore of radius r cm, the penetrating pressure p dyne per sq cm for a metal of surface tension σ dyne per cm making a contact angle $\theta°$ with the material of the pore is given by $p = 2\sigma \cos \theta / r$.

For spherical grains of radius R cm, the radius of the effective pore as shown by the colored circle is 0.154 R cm. Thus the penetrating pressure should be approximately $p = -2\sigma \cos \theta \div 0.154R$.

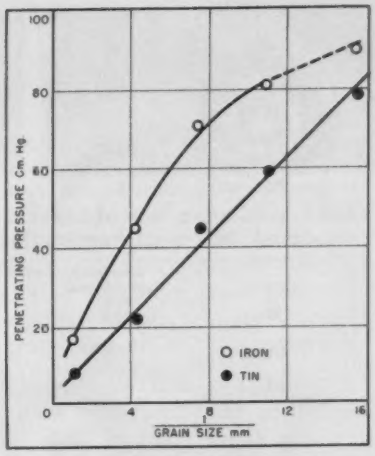


Fig. 8—Influence of mean grain size on penetrating pressure for tin at 1200° F and iron at 2910° F

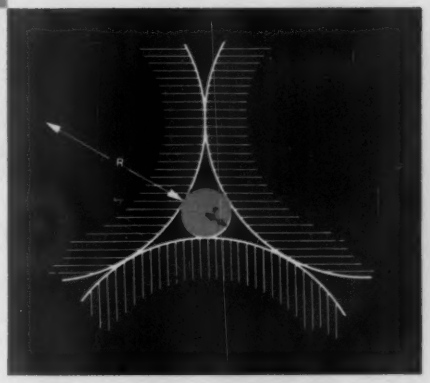


Fig. 9—Idealized pore formed between spherical sand grains. The small circle shows effective pore

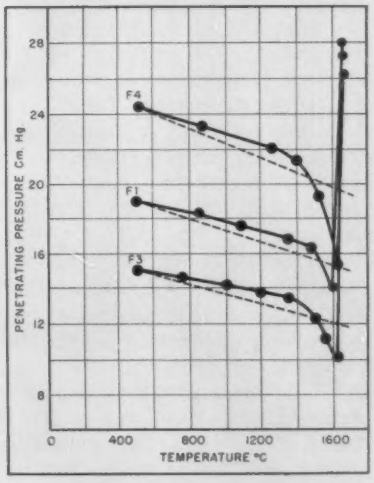
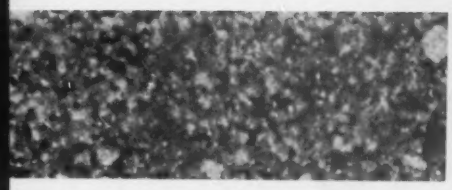


Fig. 10—Variation with temperature of penetrating pressure for tin into three varieties of sand



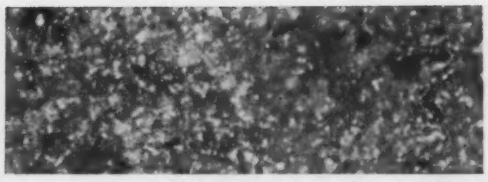


Fig. 11 and 12 (above, left and right) — Surface of sand heated to 2820° F and to 2950° F respectively on contact with molten tin

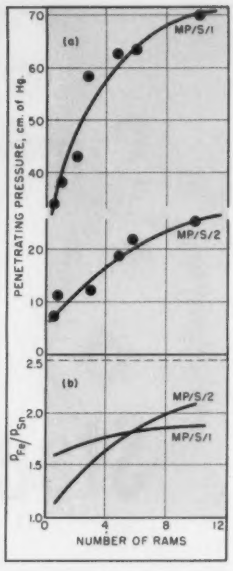


Fig. 13 — Variation of (a) penetrating pressure for Armco iron at 2910° F and (b) ratio of penetrating pressure for Armco iron at 2910° F to that for tin at 1200° F with degree of ramming of the sand

TABLE 1—Comparison of Experimental and Calculated Values of Penetrating Pressure[9]

Sand	Penetrating Pressure, Cm Hg	
	Experimental	Calculated
A	37.6	40
B	12.0	13

Table I compares experimentally determined penetrating pressure values with those obtained from the above equation. This comparison is for molten tin. Tin admittedly is a metal that rarely is cast in sand, but it has several experimental advantages. It has an accurately known surface tension and contact angle with silica, and its low melting point avoids the sort of complication due to sintering of the sand that would occur with steel. This factor is of great importance, as is shown later. In addition, since molten tin has a very low vapor pressure at its melting point, possible complications due to volatilization are eliminated. The agreement between the experimental and calculated values is extremely good considering the simplicity of the theoretical treatment.

Comparisons between experimental and theoretical values of penetrating pressure for steel do not show such good agreement, mainly because of the sintering that occurs in the sand at high temperatures.

Sintering of the Sand—To investigate the influence of sintering on the effective pore radius of a sand, an extensive series of experiments[6] was carried out whereby the penetrating pressure for tin into various sands was determined over the temperature range from 930 to 3000° F. Fig. 10 shows a typical series of results for three sands. The dotted line on the graph is calculated from the penetrating pressure at 930° F and reflects the reduction of surface tension with increasing temperature. The variation of surface tension of tin with temperature is known to be linear over the temperature range from 570 to 1920° F, and it is assumed that it remains so up to 3000° F. Consequently, any deviation of the experimental values of penetrating pressure from this line indicates variations in the effective pore radius of the sand.

The results show that up to about 2460° F (1350° C), there is a slight decrease in effective pore radius of the sand which probably is caused by swelling of the clay binder. Between temperatures of the order of 2460 to 2910° F (1350-1600° C), there obviously is a marked opening up of the effective pore radius due to sintering and fusion of the sand. The sudden increase in penetrating pressure at about 3000° F (1650° C), an effect which unfortunately cannot be reproduced readily in practice, is due to closing of the sand pores on the formation of a glassy surface by nearly complete fusion of the sand.

The temperature at which the pores begin to open up after sintering is somewhere between the A and B sintering points of the sand. Fig. 11 and 12 show the surface of a sand that has been heated to 2820° F and 2950° F on contact with molten tin. The formation of a few large pores in the surface of the higher temperature specimen can be seen readily.

A comparison of penetrating pressure values for tin at low temperatures of the order of 1200° F, at which no sand sintering occurs, with those obtained with steel at 2910° F, makes it possible to investigate the influence of sintering on the dimensions of the sand pores.[9] Such investigations have shown that for a well rammed sand, the dimensions of the pore are increased by about 20 to 40 per cent by sintering. The actual value depends primarily on the extent of the sintering and the fineness of the sand—the opening up of the pores being greater with finer sands, as might be expected. For softly rammed sands, the influence of sintering is more marked; dimensions of the pores increase at times by as much as 100 per cent. Since soft ramming unfortunately is general, as substantiated later, its deleterious effect when coupled with sand sintering cannot be overemphasized.

For all generally available steel foundry sands, the use of a finer sand ordinarily will lead to a reduction in penetration, even though the influence of sintering is slightly more marked. Thus, the practice of incorporating fine fillers such as fine silica flour or relatively inert clays into a molding sand is to be indorsed as a method of improving surface finish. The general trend during the last 20 years has been to reduce the permeability of steel molding sands. Dry permeability values of 30 to 40 are not uncommon today, although prior to World War II. they rarely would have been used.

Degree of Ramming—Influence of the degree of compaction of a sand on its resistance to penetra-

tion is most marked. To emphasize this point, the penetrating pressure for a well rammed coarse sand of say AFS fineness 40 is little different from that of a slackly rammed, fine sand of AFS fineness 80.

Fig. 13 shows the variation in penetrating pressure with a number of standard rams for a low carbon steel at 2910° F.[9] The figures shown for half a standard ram were obtained by allowing the standard rammer to fall through only 1 in. instead of the usual 2 in. It can be seen in the case of the finer sand that the penetrating pressure is increased by a factor of approximately two over the range one-half to ten rams and by a factor of more than three for the coarse sand. This type of result is typical of that obtained for a wide range of sands and represents the combined influence of ramming and of sintering.

The main reason for this marked influence of ramming of clay-bonded sands on their resistance to penetration is their poor flowability. Considerable energy is required to bring the grains into intimate contact leading to pores of the idealized form shown in Fig. 9. For oil-bonded, CO_2 process, and other sands in which frictional forces are much less and sand flowability is superior, the influence of ramming is less marked. Fig. 14 shows typical curves of sand density versus number of rams for an oil-bonded and a clay-bonded sand. This type of curve gives a true measure of sand flowability, and the curves of penetrating pressure versus number of rams will be similar.

The great practical importance of ramming for general mold production has been emphasized by carrying out a survey of ramming of molds produced under typical production conditions.[9] The technique employed is comparatively simple and may form a useful method of control for general use in foundries.

Samples of sand are removed from molds by insertion of a 1-in.-diam cork borer about 1 in. into green sand. A sharp twist of the borer permits easy removal of the sand. The sand then is pushed out with the aid of a stripping post until a ½-cm cylinder of sand protrudes. This is sliced away carefully, dried, and weighed. This operation is repeated so that the variation in bulk density below the rammed surface may be determined. Correlation of these bulk density figures with those obtained from standard rammed compacts provides the degree of ramming of the mold in terms of standard rams.

A typical series of results obtained on an experimental mold is illustrated in Fig. 15; this mold measured 6 x 6 in. horizontally and was 14 in. high with a superimposed riser 10 in. high. It was hand rammed by an experienced molder, but the large variation in the degree of ramming over the vertical face is most marked. Values in the range of 1 to 3 standard rams are the most frequent. The first rammed material was compacted to the greatest degree, as might be expected. Its compaction corresponded to that of approximately ten standard rams. Values less than one standard ram are not uncommon with inexperienced molders and with some molding machines.

As mentioned before, approximate values of the penetrating pressure can be obtained by the insertion of standard rammed compacts into the cavities from which the density samples have been taken. The compacts should be located to cover a wide range of metallostatic pressures. From the absence or presence of penetration on the casting at the locations corresponding to those of the compacts, values of the penetrating pressure can be estimated. In addition, this technique enables modified sand mixes to be tried in production molds at points where penetration difficulties are experienced without the necessity for large-scale initial trials. It is most encouraging that values of penetrating pressure obtained on production molds by this technique have shown very good agreement with those obtained in the laboratory.

Mold Atmosphere—In practical steel founding, the atmosphere in the pores of the mold generally is oxidizing, although when organic binders are employed, reducing conditions probably exist, particularly during the early stages of casting. The rapid evolution of gases from volatile materials within molds and cores no doubt creates within the pores a substantial pressure that tends to counteract the metallostatic pressure and reduce the chance of penetration. This gas pressure can be only comparatively short-lived, however, since

Fig. 14—Variation of sand density with number of standard rams for oil-bonded and clay-bonded sands

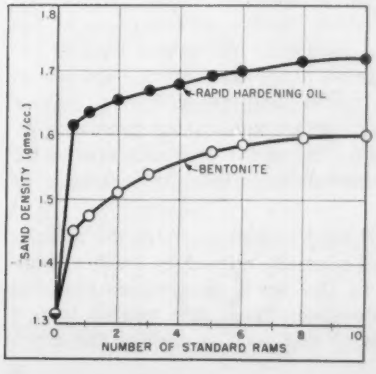


Fig. 15—Variation of degree of ramming over vertical face of a mold 14 in. high by 6 in. square

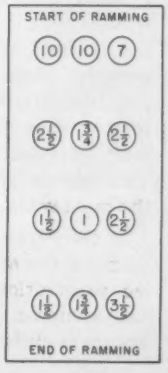
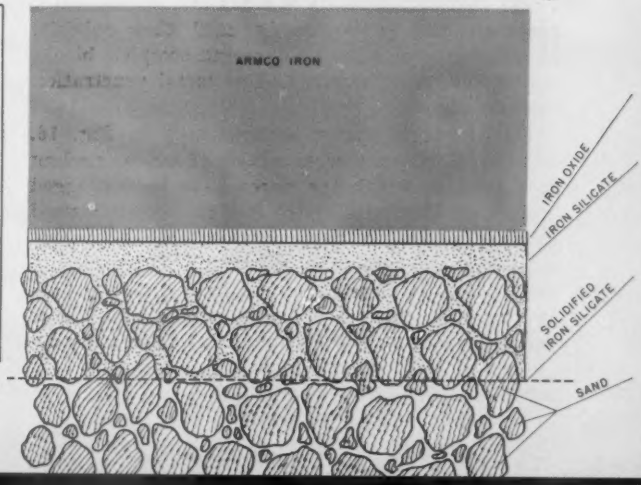


Fig. 16—Prevention of penetration by formation of iron silicate at mold surface (schematic)



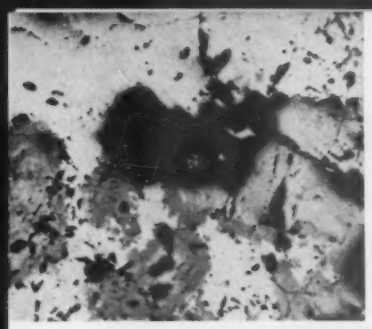


Fig. 17—Cross section of clean-peeling facing sand. X 75

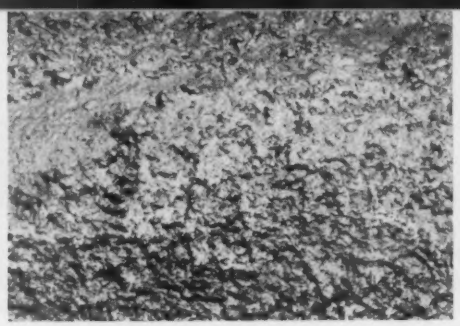


Fig. 18—Typical surface of manganese steel casting. X 1.5

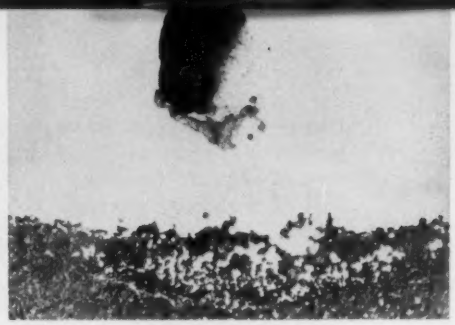


Fig. 19—Metal penetration via a crack in silica wash. X 4

the gases permeate the sand rapidly.

Presence of an oxidizing atmosphere within the pores leads to an extensive formation of oxides and silicates at the metal-mold interface and within the facing sand. Savage and Taylor[5], by melting small pellets of steel in contact with sand by high-frequency heating, showed quite extensive formation of fayalite ($2FeO.SiO_2$). The author[6] examined a wide range of samples of clean peeling and penetrated sands from commercial castings and identified, by x-ray and petrographic techniques, fayalite and also clinoferrosilite ($FeSiO_3$) at and near the interface. The actual influence of these slag materials on metal penetration and burn-on is extremely complex and not completely clear.

In practice, penetrated sand frequently can be removed with comparative ease from the surface of a casting; in all such instances, a considerable amount of slag formation is found to have occurred at the interface between the penetrated sand and the casting. At what stage this slag formation has occurred cannot be established readily, but it might well take place a substantial time after penetration has occurred. The reason for the clean peel of such penetrated sand probably is the differential between contraction of the slag and that of the casting, which leads to stresses sufficient to rupture the fine probes of metal connecting the sand to the casting.

With the penetrating-pressure apparatus, experiments were carried out at various partial pressures of oxygen.[6] It was found that the penetrating pressure for a low-carbon steel increased quite rapidly with increase of oxygen pressure. These results are due to reaction of the sand surface with iron oxide, which causes formation of viscous iron silicates that block the pores partially so that higher pressures are needed to give penetration. These viscous silicates wet silica and consequently penetrate the pores readily until they solidify. If sufficient iron silicate is present, complete blockage of the pores occurs, and no metal penetration can take place.

This effect is shown schematically in Fig. 16, and Fig. 17 shows a cross section of a clean peeling face sand in which the pores have been plugged completely by iron silicate. It must be emphasized that the latter result was obtained on a laboratory scale in the experimental apparatus. It would suggest that metal penetration can be reduced markedly by the application of oxide or slag coatings to the surface of a mold. Attempts to do this are described in the next section of this article, which covers mold and core washes.

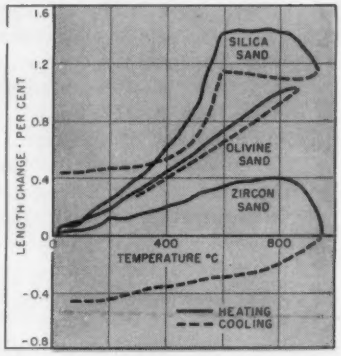


Fig. 20—Expansion and contraction characteristics of silica, olivine and zircon sands

A recent work by Hoar and McVittie[19] at Cambridge shows that the presence of iron oxide at the metal mold interface actually can lead to the formation of a burnt-on sand where no true metal penetration has occurred. It would appear that a fairly strong bond can be formed between the facing sand and the solidified casting by the formation of an oxide and silicate intermediate layer.

In addition, the formation of oxides of manganese at the interface in manganese steel castings probably is responsible for the well known poor surface finish of these castings (Fig. 18). In such instances, metal penetration does not appear to be the prime cause. The presence of these oxides appears to slag away the facing sand so much that the mold is eroded seriously and gross roughness occurs on the casting surface.

It is apparent that reaction between metal, oxides, and silica at and near the metal-mold interface are not yet fully understood, and much more work is required.

Mold and Core Washes — Ideally refractory washes should reduce the size of the pores of the facing sand to a negligible value and lead to extremely high penetrating pressures. In actual practice, silica, zircon, and other typical refractory washes give rise to penetrating pressures almost identical with those for the untreated sand. This result is caused essentially by cracking of the mold wash.

If the depth of sand heated to above the melting point of the steel is small, refractory washes localize penetration to the few points where cracking has occurred. Moreover, these fine washes have a low heat diffusivity and tend to reduce the depth

of sand heated to above the metal melting point. When thermal conditions are severe, however, as in heavy castings and especially in re-entrant angles and cores, metal penetrates the cracks in the washes, and it mushrooms out into the hot, underlying facing sand, as shown in Fig. 19.

The author[20] carried out an investigation of the thermal expansion of molding sands and mold washes to determine the cause of wash cracking. The results showed clearly (Fig. 20 and 21) that there is a substantial difference between the thermal expansion of sands and washes made from the same base material. This difference leads to the production of stresses, when the temperature is raised, in a wash coat on the surface of a compacted sand. The magnitude of these thermal stresses is increased greatly when a wash of one material is coated onto a sand of another material—for example, a zircon wash on a silica sand, as is comparatively common foundry practice.

It was shown that these stresses are sufficient to cause mold-wash cracking by measuring the expansion of a sand compact coated over its surface with a wash. Fig. 22 shows a graph of the difference between the calculated expansion and the actual expansion of the compact as a function of temperature. The difference rises sharply initially; then at about 300° F, the stresses are sufficient to fracture the wash and produce cracks. The oscillations in Fig. 22 correspond to the formation of new cracks and to the extension of those previously formed. The large expansion of silica over the range from 930 to 1110° F (500-600° C) produces sufficient stress to open up the cracks completely. Above 1110° F, the expansion of the sand is not inhibited by the wash coating. These findings were supported by examination of the compacts, and it was clear that the size and number of cracks are greater for zircon washes than for silica washes when both are coated onto silica sand compacts. Apart from these stresses due to different expansion characteristics, stresses arise because of the temperature differential between the wash and the sand during casting.

The ideal wash would be one that penetrates and plugs the sand pores and prevents metal entry. With the conventional type of refractory dressing, this action does not occur. The washes have to be quite thick and thixotropic to insure adequate suspension of the refractory particles. Consequently, when applied to a sand surface, they tend to remain on the surface as a distinct layer. The incorporation of wetting agents into the wash has been suggested as a method of obtaining wash penetration into the pores of the sand, but it has been found to be of little avail in practice. In addition, the mode of application of the wash, whether by brushing, spraying, swabbing, or dipping, does not appear to influence the degree of penetration of the wash into the sand. If anything, spraying and dipping are slightly superior.

In view of the encouraging results[6] obtained at very high temperatures and in the presence of iron oxides, when extensive surface fusion of the sand tends to seal up the mold face and leads to very high penetrating pressures, an extensive investigation[6, 21] was carried out at Cambridge into the use of mold paints based on iron oxides, iron silicates, and various viscous slags. Thin coatings of iron oxide applied to the mold face lead to a decrease in penetrating pressure. This result probably is due to the iron oxide's flowing through the sand and slagging the pores in transit, thus leading to an increase in effective pore radius. Similar results were obtained with thin coatings of fayalite, lime, and aluminum silica.

It is apparent that the prime cause of failure of these washes is that there was not sufficient present to fill the pores completely with viscous slag, as indicated schematically in Fig. 23. Very heavy application of these coatings achieved the desired result of avoiding penetration, even under very heavy metallostatic pressures. Limited foundry trials with such washes have shown, however, that the finish varies from severe penetration to smooth skin, depending on such variables as pouring temperature of the steel, section thickness of the casting, etc. Once again, it is considered that much more work needs to be carried out before washes of this type can be used effectively.

(To be concluded next month)

REFERENCES

18. D. H. Houseman, unpublished work.
19. T. P. Hoar and D. M. McVittie, unpublished work.
20. D. V. Atterton, *Journal*, Institute of British Foundrymen.
21. D. H. Houseman, unpublished work.

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Fig. 21—Expansion and contraction characteristics of silica and zircon mold washes

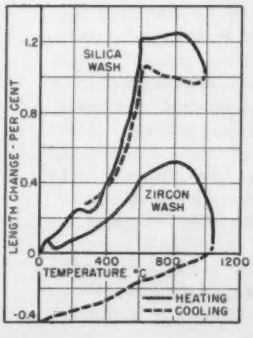


Fig. 22—Difference between calculated and actual expansion of wash-coated compacts with temp

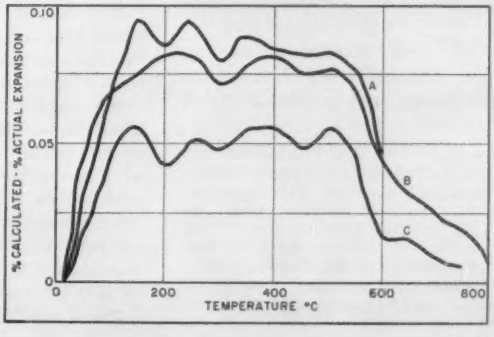
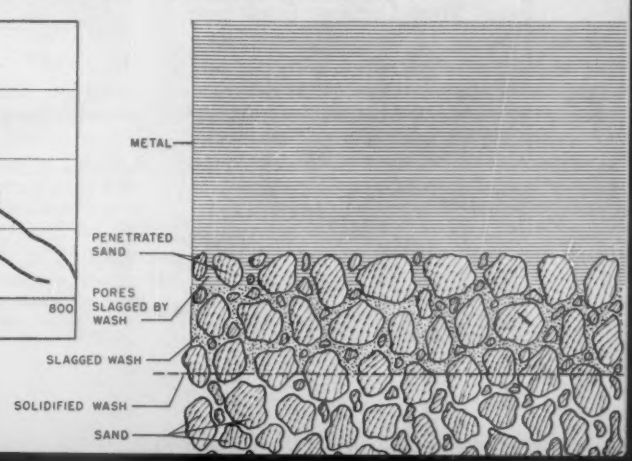


Fig. 23—Result of the application of an incomplete slag wash (indicated schematically)



Questions and Answers

Several materials are available for filling minor surface blemishes on castings . . . Surface defect is the result of shrinkage . . . Has trouble with chills . . . Permanent mold for small castings . . . Metal gassed during melting

Metallic Filler for Castings

QUESTION We are aware that there are 100 or more iron fillers or cements on the market today. However, we have been unable to find one with a realistic gray iron color which is fast drying.

ANSWER Presumably you are referring to the numerous sources of supply rather than to differences in the cement's basic material, which is composed of iron filings or powder mixed with sal ammoniac or ammonium chloride. As to the color match, it must be realized that while iron castings generally are gray in color, there are a variety of shades, even in the same foundry. Consequently, it hardly would be possible for a maker of iron cement or filler to produce commercially the almost infinite shades of color. Even if crushed and powdered gray cast iron were used as the base, the large loss of graphite in the operation would result in a final product of much lighter color.

For quick drying or hardening, we suggest use of one of the newer compositions consisting of epoxy resin filled with ferrous powder to which an accelerator or catalyst is added to harden or polymerize the resin. The two components are separate and mixed together just before use. It is reported that the mixed material hardens in about two hours so that it can be filed, ground, or machined.

Small Steel Castings Crack

QUESTION Lately we have been running into a problem in that many of our steel castings made by the investment molding process have been cracking. Can you give us any information as to the cause?

ANSWER While you do not say so definitely, the assumption is that the cracked castings are found after shakeout rather than after heat treatment, for example. That difficulty—more commonly termed hot tearing—usually is due to mechanical restraint or hindered contraction in other types of molding processes, and undoubtedly applies to investment casting as well. One specific reference in the literature to cracking in investment casting suggests the remedies of reducing the amount of binder and/or elimination of the fines below 200 mesh in the refractory.

Skrinkage Is Cause of Defect

QUESTION We are sending you a high-copper casting on which we would like an opinion as to the cause of the surface defects occurring on the back. The alloy contains 94 Cu,

Fractured cross section of casting, enlarged approximately twice size, showing large shrink hole at right

0.75 Sn, 1.25 Pb, and remainder Zn. We have varied the pouring temperature from 2050 to 2300° F and varied our gating considerably without entirely eliminating the defects which occur on about 25 per cent of the castings. We have tried using varying amounts of phosphor-copper shot as well as varying amounts of 2 per cent lithium-copper.

ANSWER The surface defects in this particular casting are caused by internal shrinkage which created sufficient vacuum to pull down the first formed, thin skin and break it. That breakage permitted entry of mold gases which resulted in the discoloration in the immediate areas of the shrink holes found on fracturing the casting. Adjoining shrinky areas in the casting are indicated by the light yellow mottling.

Remedy, of course, is a change in gating so that the casting will be fed properly. You mention that you have tried several variations without success, but not what they were. We suggest trying a gate equal to the thickness of the casting, say ⅜ x ⅜ in., and attach it so that it is at one corner instead of the present gate location where the casting is thinner than in the adjoining section. Pour some castings and fracture them to determine whether the shrinkage is corrected. If not you probably will have to place a small riser as close to the casting as possible, and gate into it.

Chills Cause Foamy Aluminum

QUESTION Can you tell us of a chill coating that can be used in green sand molding? We are getting considerable agitation from our chills and have gone to cores where possible, but where we require denseness in some castings we are unable to use cores. Agitation from the chills creates foamy metal which collects under the skin of the casting and is opened up on machining. Castings are made of aluminum alloys.

ANSWER Casting defects caused by chills usually can be attributed to lack of cleanliness or deposition of condensed moisture. Application of a coating, however, may not help much if those conditions exist. Therefore, we suggest that you make sure that the chills are as clean as possible—free from rust, dirt, and grease.

After any grease present is removed with a suitable solvent, the chills should be abrasive blasted. Then the chills should be coated, placed in an oven until thoroughly dry, and kept in a warm, dry place prior to use. When placed in a mold, chills should be at least at the same temperature or preferably slightly above that of the sand in the mold to prevent condensation of moisture.

Mold coatings may be composed

of graphite, lampblack, clay, chalk, whiting, talc, etc., suspended in water with or without addition of a small amount of waterglass (sodium silicate). Since chill coatings are available on the market, it is advisable to purchase one rather than to try to develop one yourself. If you like to experiment, however, you might add 2 lb graphite and 8 lb clay to 1 gallon of water containing about two-thirds pint of waterglass. Another combination is 7 lb whiting, 1 gallon of water, and ½ pint waterglass.

A volatile type coating which is dried rapidly after application by ignition with a torch is composed of 10 lb talc, 1 lb rosin and 2¼ gallons of isopropyl alcohol. With reference to the chills themselves, it has been found in some instances that serrated surfaces on the faces appear to give less trouble. Also, instead of using large chills, they are made up in smaller sections.

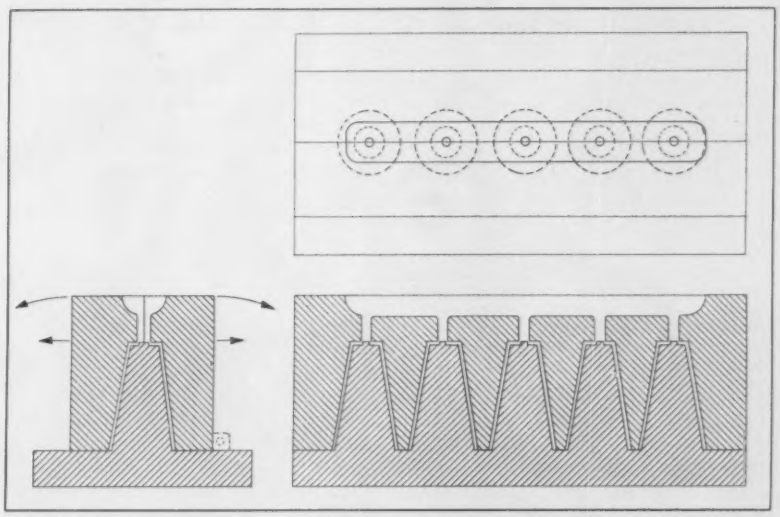
Permanent Mold vs. Sand

QUESTION We are enclosing a product which we manufacture completely in our plant. It is a small electric light fixture for placement on the lawn or in other locations for concealed illumination. The aluminum shell is made in our foundry in green sand from a matchplate containing ten patterns. We would like to know whether or not it is practical to make this casting in a permanent mold. If so, how many cavities should the mold contain to make it a profitable venture? We have little or no experience in the permanent mold field. Is there much in the way of equipment necessary? We employ a 300-lb gas-fired furnace for melting the aluminum.

ANSWER So far as we can see, your cone-shaped light fixture will lend itself easily to the permanent mold process, but whether or not it would be a less expensive method than your present sand molding process is a matter for careful consideration.

Permanent molds, as you undoubtedly know, are expensive. Since they are designed for long production runs, however, the cost per casting is quite low. Presumably you have available all the data covering costs to produce one of the castings in green sand so that you can make a comparison with cost of the proposed permanent mold practice.

We are enclosing a rough sketch illustrating a possible method for producing five castings at a time in a permanent mold. The mold is in three parts—a base plate containing projections to form the interior of the fixture, and two sections split vertically which contain the cavities forming the shells. Those sections can be hinged to the base plate portion to open like a book for removal of the castings, or they can be arranged to slide horizontally on the base plate. Runner or feeder is at the top, with small pencil gates into each cavity.



Proposed arrangement of permanent mold for producing five shell castings

You will note that a small boss on top of the projection to form the interior extends up into the pencil gate, which is enlarged in that area to permit easy flow of the metal into the cavity below. That extension, of course, forms the hole for admission of the wire, and also exposes the hole when the gate is cut off. Use of a fixture to hold a gate of castings and a band saw will permit sawing the gates closely enough to the casting so that little if any other work will have to be done.

If this mold will operate on a 5-minute cycle, the production will be 60 castings an hour or 480 per day. That figure would have to be compared with the production rate in sand. One also should consider the number of good castings produced by each method; ordinarily permanent molding has the edge. Costs involved in cleaning, removal of gates, etc., also should be compared. In addition, you would have to prorate the mold cost against each casting, based on a mold life of 20,000 pourings or better.

Since you have no experience in permanent molding, probably your best procedure would be to get in touch with some firm which designs and manufactures permanent molds. It can provide figures on mold cost and production rate on which you can base cost comparisons, and determine the more economical method.

Has Gas Trouble with Bronze

QUESTION Recently we built an oil-fired furnace for bronze melting which operates satisfactorily, but we are running into gas trouble on the face of our bronze grave markers. We know that the condition is originating in the furnace since we never had the trouble when using a coke-fired unit. Please advise us on the simplest method of removing gas from bronze. Also can you tell us whether process patents exist on the method of making castings with an abrasive face?

ANSWER While there are several procedures for removing gas picked up during the melting of brass and bronze, a more logical approach would be to conduct the melting operation so that the gas pickup is at a minimum. We suspect that the oil burner on your furnace is not adjusted properly, so that the flame produces a reducing atmosphere in the furnace

rather than a slightly oxidizing or neutral condition. Try increasing the air or reducing the oil, or perhaps both, and observe the results. Methods of removing absorbed gas include subjecting the molten metal to vacuum degassing, injection of nitrogen gas, use of copper oxide, manganese dioxide, lithium, copper boride, etc., and even marble chips.

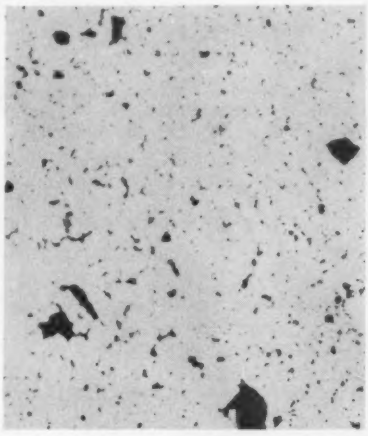
We cannot give you a definite statement about the existence of patents on the production of abrasive-faced castings. A patent was issued in 1915 covering use of sodium silicate as the adhesive to hold the abrasive on the mold face. One issued in 1922 referred to use of refractory clay, flour, and core binder for the same purpose.. A patent search would be needed to answer your question definitely.

Trap Casting Shows Shrinkage

QUESTION We are sending you one of our cast brass traps, which are causing quite a bit of trouble in that porosity shows up during the polishing operation. It is made with four patterns on a 12 x 18 in. plate. Runner is ¾ x⅝ in., tapering down to ⅜ x ½ in. The end gates are 1¼ x ⅜ in. at the runner and 1⅛ x ⅛ in. at the patterns, plus ⅛-in. fillets at the patterns. We are melting with natural gas, using a No. 70 crucible. We degas the metal with nitrogen and pour the castings at 2200° F. Alloy is 85-5-5-5 ingot with gates and borings. Flasks are 4 in. deep on cope and drag. Trouble is not consistent since we vary with each run from 3 to 35 per cent rejects.

ANSWER Difficulty with surface pinholes—or porosity, as you term it—usually is associated with gassy metal. Examination of fractured sections, however, indicates that your trouble is shrinkage due to lack of feeding. Possibly that may be complicated with gas either in the metal or inspirated or entrained in the metal during pouring.

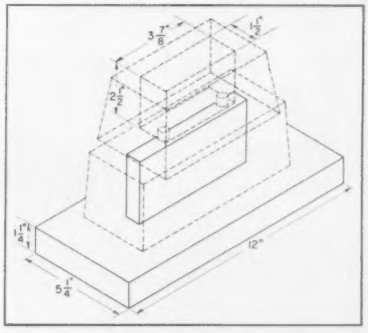
Although you mention that you are degassing with nitrogen—which should eliminate or keep to a minimum gas absorbed during melting—the operation may not be functioning properly. To determine if the



Black areas in unetched micrograph are shrinkage voids. X 40

nitrogen degasing is effective, you should run a check test before pouring each crucible.

This test can be done rather quickly by use of a chilled test plate



Sketch showing chill plate, core mold and pouring basin for fracture plate

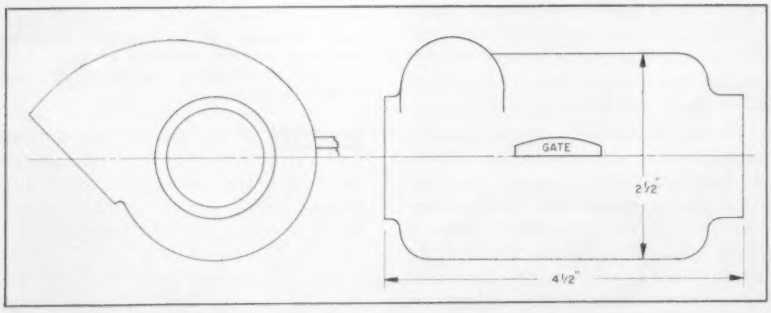
¾ x 3 x 6 in., as suggested by Rote, Baker and Upthegrove in *Transactions,* American Foundrymen's Society, 1950. The plate, with one of the ¾ x 6-in. faces against the chill, is made in a core sand mold. It is fractured across the vertical section about 2 in. from one of the edges. As indicated in the accompanying sketch, the chill plate is 1¼ in. thick, 5¼ in. wide and 12 in. long. The pouring basin also is made of core sand. Basin cavity is 3⅞ in. long, 1½ in. wide, and 2½ in. deep, and the metal feeds into the mold through two ½-in.-diam holes in the bottom.

Fractured sections are examined for appearance and presence of mottled structure, small gas holes, etc. Details relating to fracture appearance are given in the paper. In brief, the authors point out that the depth of the blue-gray color of the fracture from the chill face should be at least 1¾ in. Interspersed with the blue-gray fracture and near the chilled face are the characteristic columnar patterns which extend at least ½ in. and as much as 1½ in. upward into the casting. Fracture beyond the columnar pattern is moderately fine grain, with the upper region above the blue-gray portion tending toward a gold color up to the air-cooled face. Over-all color of the fracture is a distinct blue-gray tint. Mottled appearance is indicative of gas and lower quality metal; the greater the mottling, the lower the quality.

A somewhat quicker and less informative test is to pour, in green sand, a tapered round slug about 1 in. diam at bottom, 1¼ in. diam at top and 6 in. long. When it is broken in the center, the fractured surfaces reveal if gas is present by appearance of a dendritic structure.

As mentioned earlier, the primary difficulty is one of shrinkage, and you will have to make some change in the gating system to insure proper feeding. We suggest placing blind risers about 1 in. in diam and 2 in. high over the runner where the gates to the casting cavities are taken off. This suggestion is based on the premise that the casting cavities are in pairs opposite each other, and one riser will feed two cavities. If the cavities are offset and gated individually, the risers can be placed closer to the cavities.

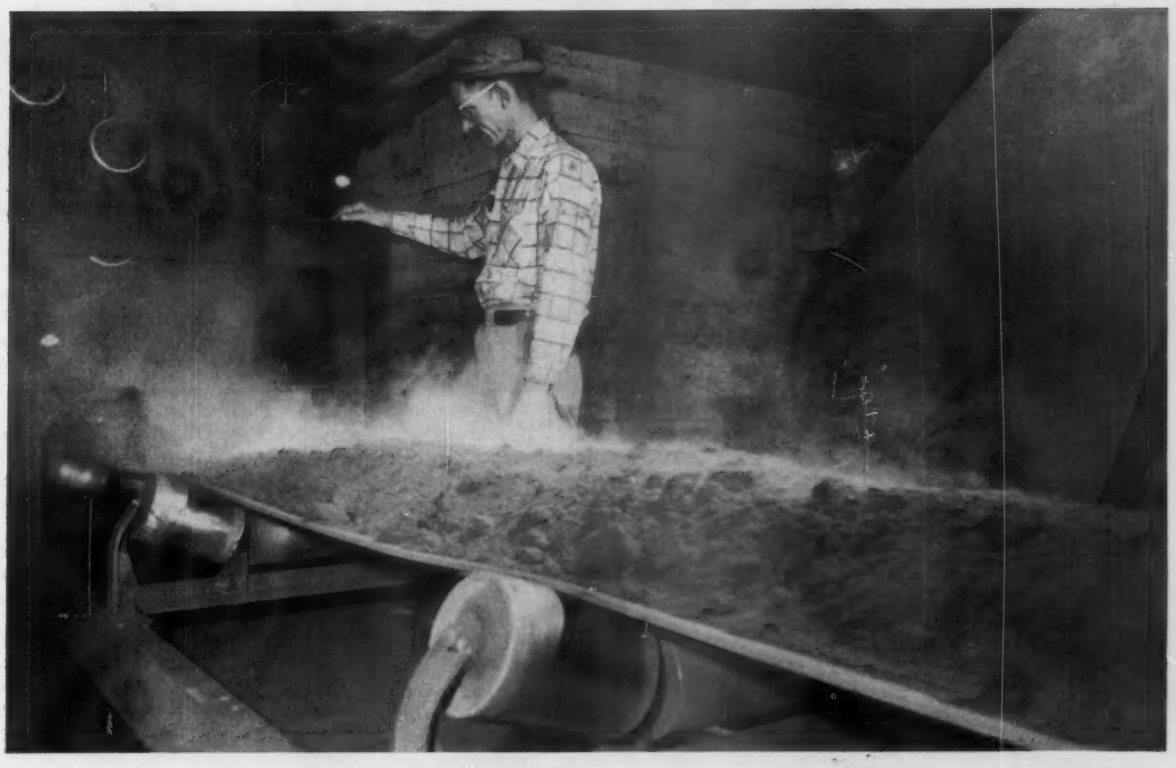
Possibly some air is entrained in the metal during pouring. To minimize entrainment it may be advisable to decrease the size of the opening at the bottom of the sprue so that the cross-sectional area is about one-fourth to one-sixth that of the runner. Present runner has a cross-sectional area of 0.469 sq in., hence the opening at the bottom of the sprue should be ⅜ to 5/16 in. in diam. That arrangement will enable the pourers to keep the sprue filled, and also reduce turbulence in the runners and gates.



Drawing of the brass trap casting indicating its conformation, some dimensions, and the location of the gate attachment

FOUNDRYGIANT CONVEYOR BELT

Tramp Iron can't go on a TEAR on this belt!



Hot foundry sand loaded with jagged pieces of tramp iron is a murderous combination for a conveyor belt.

That's why this leading Southern foundry uses U. S. FoundryGiant *RipStop* Conveyor Belts. These special heat-resistant belts have rip-stopping wire ribs imbedded in the carcass across the belt at 3' intervals to prevent the jagged pieces of metal flash, sprues, gates, geigers, etc., from going on a tear and wrecking the belt. Where previous belts lasted only 2 or 3 months, the "U. S." belts are lasting 8 times as long!

Two FoundryGiant cotton-nylon belts convey the tramp-infested hot sand from both the shakeout and sand-slinging unit to storage bins. These thinner belts, made possible by the considerably stronger cotton-nylon carcass, allow for much more efficient tramp iron removal by keeping the load closer to the core of the magnetic field of the head pulley.

"All in all," says this smooth-running foundry's master mechanic, "these belts save us about 500 man-hours a year in belt repair and replacement. We're very happy with their performance."

U. S. Rubber Conveyor Belts for every foundry requirement (along with expert "U. S." engineering assistance) are available at your convenient "U. S." distributor, or by contacting us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's new Exhibit Hall, Rockefeller Center, New York 20, N.Y.

Circle 615 on Page 51

Men of Industry

● DON DeMERCE
. . . joins Mercast Mfg. Corp.

● EDWARD P. SANDBACK
. . . chief metallurgist

● WILLIAM K. GIBB
. . . heads Washington Chapter

● DR. B. D. THOMAS
. . . Battelle Memorial pres.

IRVIN S. DOW was recently named manager of Cleveland operations, Aluminum Co. of America, succeeding **Hugh J. Morrison** who has been named assistant general manager of the company's fabricating division, Pittsburgh. Mr. Dow attended Purdue University. In 1929 he joined Alcoa in Cleveland, where he became chief industrial engineer of the sand foundry, later was plant manager in Kansas City, Kans., and after serving as assistant manager of Alcoa's plant in Los Angeles, became manager of the Detroit Works in 1952. Mr. Morrison, with the company since 1929, was superintendent of the extrusion and forging departments, Edgewater, N. J., manager of the aluminum forging plant, New Castle, Pa., and in 1944 went to Cleveland to manage the company's forge plant there. In 1952 he was named assistant manager of the entire Cleveland Works. **E. D. Mairs**, manager of Alcoa's Lafayette, Ind.. works, has also been named assistant general manager of the fabricating division.

● **Don DeMerce** has been appointed plant manager, Mercast Mfg. Corp., La Verne, Calif., subsidiary of Mercast Corp., Beverly Hills, Calif. Until recently he was manager in charge of production, development, assembly, and testing of aircraft and missile control valves, Southwestern Valve Corp., Santa Ana, Calif., and previously was associated with Vickers Inc., El Segundo, Calif.

L. B. Howerton has been elected president, and **Geza Demeter**, vice president, Rex Precision Casting Corp., Culver City, Calif.

● **Edward P. Sandback** has been named chief metallurgist, Mackintosh-Hemphill Div., E. W. Bliss Co., New York, succeeding **Charles E. Peterson**, recently named manager of manufacturing operations for the division's plants in Pittsburgh and Midland, Pa. Mr. Sandback will head the metallurgical departments in those plants. He was previously with United Engineering & Foundry Co., Pittsburgh.

● **William K. Gibb**, chairman of the Washington Chapter of the AFS for 1957-58, is chief inspector, Atlas Foundry & Machine Co., Tacoma, Wash. He was graduated from University of Washington and while studying for his degree in metallurgical engineering there he was a part-time foundry instructor and taught evening classes to foundry apprentices. In 1950 he joined Boston Electro Steel Casting Inc., Boston, and was inspector of castings there when he became associated with Atlas Foundry the following year. Mr. Gibb was vice chairman of Washington Chapter last year.

Lewis W. Berger has been appointed training supervisor, Metals Engineering Institute, American Society for Metals, Cleveland. Formerly principal metallurgist in the nonferrous physical metallurgy division, Battelle Memorial Institute, Columbus, Ohio, he was graduated from Massachusetts Institute of Technology in 1950. While studying for his master's degree in metallurgy at Columbia University, he was employed as research associate and teaching assistant in physical metallurgy.

● **Dr. B. D. Thomas** has been named president, Battelle Memorial Institute, Columbus, Ohio, succeeding **Dr. Clyde Williams**, who retired recently. Active head of Battelle since being named its director a year ago, Dr. Thomas joined the organization in 1934 as a research engineer, became assistant director in 1942, and vice president in 1955. He established and headed its first chemical research division in 1939, and was a key figure in establishment of Battelle's research laboratories in Frankfurt, Germany, and Geneva, Switzerland.

Joseph I. Andreini recently joined Bucyrus-Erie Co., South Milwaukee, Wis., as manager of manufacturing where he will direct operations for the company's plants in South Milwaukee, Erie, Pa., Chicago, and Evansville, Ind. He was formerly vice president-operations, Pesco Products Div., Borg-Warner Corp., Bedford, Ohio. **Robert G. Allen**, formerly vice president, has been named executive vice president of the company.

Vincent Delport was recently elected an honorary member of the Association Technique de Fonderie de France in appreciation of his outstanding services to the French foundry association. Mr. Delport is treasurer of Penton Publishing Co. Ltd., London, and European editor of FOUNDRY.

Nicholas J. Decker has been named general works manager, Koehring Div., Koehring Co., Milwaukee. **Robert Williams** has succeeded Mr. Deck-

You Can Always Rely on the Uniform Quality of WOODWARD IRON

Confidence of the foundry trade in the consistent uniformity of Woodward's quality merchant iron has been the biggest single factor in building this Company over the years from a small enterprise into one of the nation's largest independent merchant iron producers.

Confidence is not easily won. It is acquired by strict adherence to exacting standards, unceasing effort to maintain and improve the quality of output, and fair dealing with all customers.

The steadily increasing number of Woodward customers attests the confidence of foundrymen in Woodward's dependability and the high quality of uniform Woodward iron.

Your inquiries are invited.

Sales Department, Woodward, Ala.
Phone Bessemer, Ala. 5-2491

or Sales Agents for territory north of Ohio River:
HICKMAN, WILLIAMS & COMPANY with Sales Branches at—

609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.

Woodward Iron Company

WOODWARD, ALABAMA

Independent Since 1882

Circle 616 on Page 51

● OTTO A. PFAFF

● JAMES F. CONNAUGHTON

Wheelabrator Corp. appointments

● LEON B. ROSSEAU

. . . Ajax Electric pres.

● VERNON J. SADLER JR.

. . . AFS Chapter Chairman

er as works manager. **Peter Miles,** formerly assistant foundry manager, was named foundry works manager.

● **Otto A. Pfaff** has retired as president, Wheelabrator Corp., Mishawaka, Ind., and will continue as board chairman. **James F. Connaughton,** former executive vice president, has been elected president. With the company since 1916, Mr. Pfaff served 22 years as general manager and 17 years as president-general manager. He served two terms as president of Foundry Equipment Manufacturers Association and is a former director of the America Foundrymen's Society. Mr. Connaughton joined Wheelabrator last June following his resignation as president, American LaFrance Corp., Elmira, N. Y. He was previously vice president-general manager, Eddystone Div., Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

Carl Winkler has been elected president, Cleveland Standard Pattern Works, Cleveland, succeeding the late Christian Birnbaum. **John F. Roth,** formerly secretary-treasurer of the company, has been named vice president and will continue as treasurer. Mr. Winkler will take over the duties of secretary.

William A. Meissner Jr. was recently appointed director of the Copper Division, Business and Defense Services Administration, Department of Commerce, Washington. Since 1952 he has been deputy director of the division. Mr. Meissner has been associated with the copper industry for 35 years, starting in 1922 with the foundry of Republic Brass Co., Cleveland.

John W. McCue has been appointed field engineer in the Indianapolis district office, Norton Co., Worcester, Mass. He was formerly abrasive engineer in Chicago. Mr. McCue joined Norton in 1946.

● **Leon B. Rosseau** has been elected president-treasurer, Ajax Electric Co., Philadelphia, succeeding **John E. Haig,** who will continue on a consulting basis. Mr. Haig, one of the Ajax Electric founders 27 years ago, has spent over 40 years in the furnace business. Mr. Rosseau, formerly vice president-general manager of Ajax, has been associated with the company 17 years. Previously he was industrial heating specialist, General Electric Co., Schenectady, N. Y. **H. W. Schrader,** production manager, has been elected vice president, and **B. R. Russell,** comptroller, has been named secretary of Ajax Electric.

H. A. Rehfeld has been appointed sales manager, Eastern Div., American MonoRail Co., Cleveland, succeeding **W. P. Conway,** who resigned to become general manager, Production Equipment Co., Meriden, Conn. Mr. Rehfeld was Atlantic district manager, and previously was associated with Louden Machinery Co., Fairfield, Iowa, and Link-Belt Co., Chicago. **L. R. McEachern** has been appointed sales manager, Southeastern Div. for the company. **W. A. Bayes** has been named Chicago district manager. **D. A. Bollinger** has succeeded Mr. Bayes as Detroit manager.

L. J. Venne recently joined Electro Metallurgical Co., Division of Union Carbide Corp., New York, as sales representative in the foundry section, Metallurgical Service Division, Cleveland. He was previously associated with U. S. Steel Corp., Pittsburgh, and American Steel Foundries, Chicago.

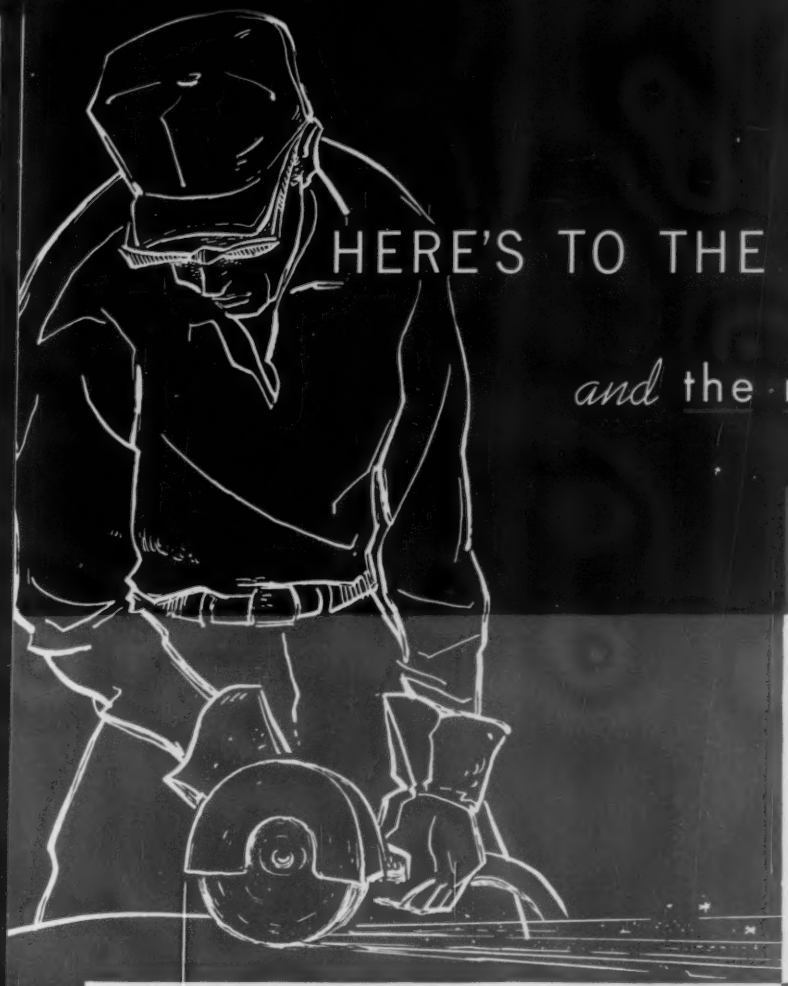
C. E. Klumb, secretary and sales manager, West Bend Equipment Corp., West Bend, Wis., has been reelected president, Association of Lift Truck and Portable Elevator Manufacturers, Pittsburgh.

● **Vernon J. Sadler Jr.,** chairman of the Saginaw Valley Chapter of the AFS for 1957-58, is assistant to the secretary-treasurer, General Foundry & Mfg. Co., Flint, Mich. He attended General Motors Institute, Maher's Business College, and Albion College, entering General Foundry & Mfg. Co., in 1940 as a molder. Later he worked as a production checker, in the payroll and purchasing departments, laboratory, as well as in time and motion study and cost accounting previous to his present appointment. Mr. Sadler is a past president of the Michigan Cost and Management Group, Gray Iron Founders' Society, and also served as secretary-treasurer of the group. Active in the Saginaw Valley Chapter, he previously served as a director and secretary-treasurer.

Albert P. Gagnebin and **L. E. Grubb** have been appointed assistant vice presidents, International Nickel Co., New York. Mr. Gagnebin continues as manager of the nickel sales department. Mr. Grubb, since 1953 general superintendent of the Huntington, W. Va., works, will be in charge of labor relations at all of the company's domestic plants.

Richard T. Tiebout, former assistant director of sales, Baker Industrial Truck Div., Cleveland, has been appointed director of sales, replacing **G. B. Davis,** resigned. **Robert J. Laws,** for the last year manager-sales engineering, has succeeded Mr. Tiebout as assistant sales director.

Frank A. Pattie has been appointed sales manager, Wedron Silica Co., Chicago. With the company about eight years, he has served as a sales representative recently. **Dee C. Rose** has joined the company as sales service representative with headquarters in Chicago. During 1956 and until last October he was associated



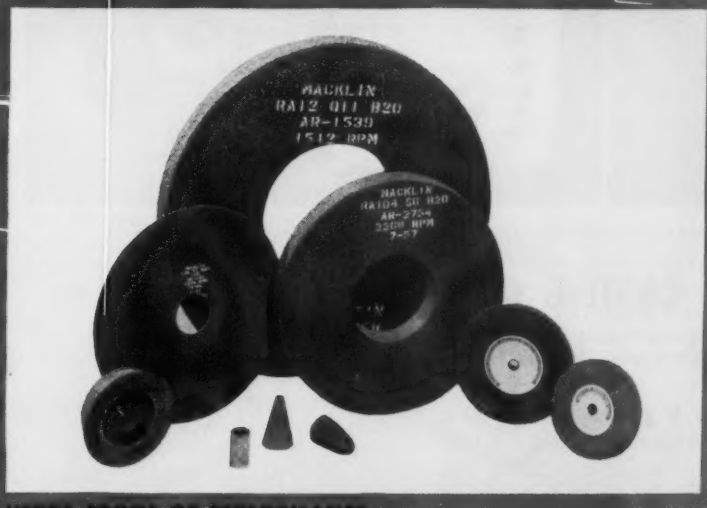
HERE'S TO THE COST YOU'LL CUT

and the metal, too!

with NEW

MACKLIN B-20

RESINOID SNAGGING WHEELS



For floor stands, portables, swing-frames, and cut-off, too, users report more production per wheel dollar with the new Macklin B-20 wheel. There's a sound engineering reason for this. The B-20 is tough. It gives better impact resistance. More and sharper cutting edges provide extremely free cutting . . . better heat resistance. *Start saving now.* Test the B-20 on your own job.

HERE'S PROOF OF PERFORMANCE

- "Extremely fast, superior life, on steel castings"
- "Very satisfactory cutting off valve stems."
- "Increased production 15% stand grinding pearlitic malleable castings."
- "Best wheel ever used for slitting piston rings. No burr."

For complete facts and specifications send for B-20 literature today.

GRINDING WHEELS

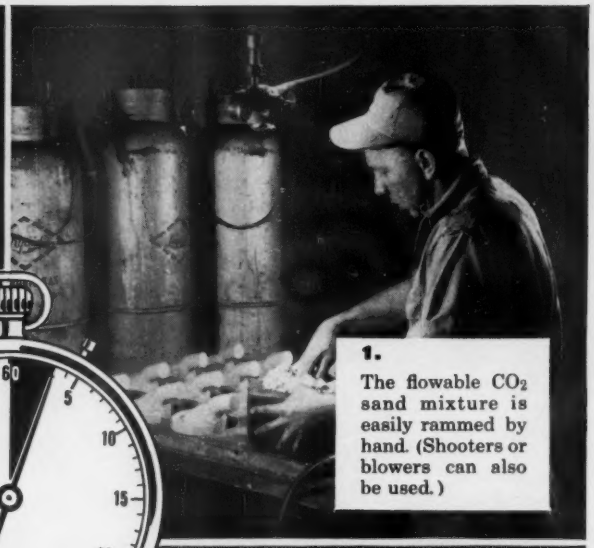
MACKLIN company Dept. ZZ, Jackson, Michigan

MACKLIN OF CANADA, LTD., Harrow, Ont., Canada

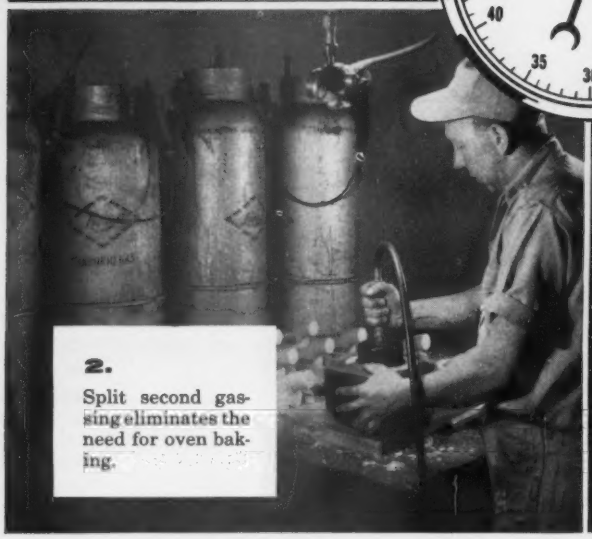
Circle 626 on Page 51

COMPLETE CORE IN 3 MINUTES

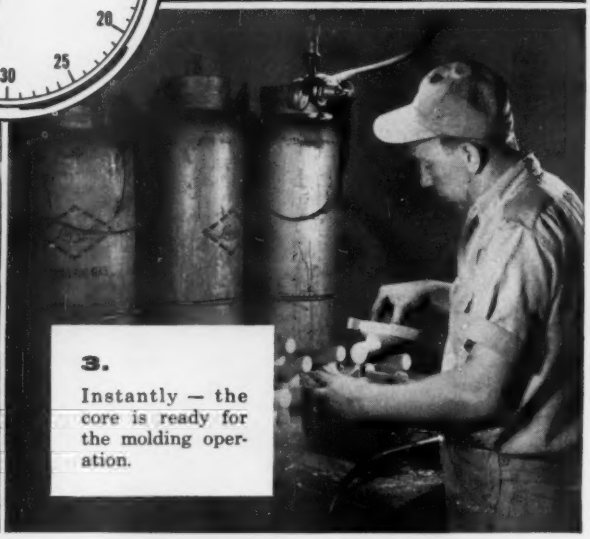
Rammed, Gassed and Removed!



1. The flowable CO_2 sand mixture is easily rammed by hand. (Shooters or blowers can also be used.)



2. Split second gassing eliminates the need for oven baking.



3. Instantly — the core is ready for the molding operation.

The CO_2 process proves to be a fast and economical method for core production at the J. M. Bruce Foundry in Cedar Grove, Wisconsin.

CO_2 PROCESS INCREASES CASTING CAPACITY . . . CUTS EQUIPMENT COSTS . . . ELIMINATES CORE STORAGE!

Glen and Mark Bruce, who operate the 40 year-old J. M. Bruce Foundry Co., are enthusiastic about the use of CO_2. An actual cash savings of thousands of dollars is reported due to the decrease in baking equipment and core storage. Valuable floor space previously used for core storage is now allocated to actual production use.

For J. M. Bruce Foundry Co. the big advantages in CO_2 are the increased size of the castings they can pour (without buying special core equipment)—50% reductions in core costs . . . virtual elimination of "plows" . . . no danger of drops, soft or wet spots . . . reduced core handling, extreme speed and flexibility in supplying core needs, and *making cores only when they need 'em.*

Get the facts on CO_2 core and mold making—complete information sent upon request.

World's Largest Producer of CO_2

LIQUID CARBONIC

DIVISION OF GENERAL DYNAMICS CORPORATION

3150 South Kedzie Ave., Chicago 23, Illinois

● WILBUR R. FERGUSON
. . . heads AFS Chapter

● LEN WICHMAN
. . . regional sales mgr.

● ARCHIE J. SMITH
. . . West Coast sales

● DOUGLAS L. WARNER
. . . division sales mgr.

with Pennsylvania Foundry Supply & Sand Co., Philadelphia, as sales-service representative in the New England territory. Previously he was with Dodge Steel Casting Co. there.

● **Wilbur R. Ferguson,** who is chairman of the Northwestern Pennsylvania Chapter of the AFS, has been district sales manager of the Erie, Pa., office of Pickands Mather & Co. for the last two years. He attended the College of Engineering, Ohio State University, and the Ceramic Division, Battelle Memorial Institute, where he worked for 6½ years in Battelle's Process Metallurgy Division. He left Battelle to join the pig iron and coke sales department of Pickands Mather. Mr. Ferguson served as secretary of Northwestern Pennsylvania Chapter last year.

● **Anton Dorfmueller Jr.** has been named general sales manager, **James J. Schwalm** eastern sales manager, and **John M. Sweeney** product manager in charge of the facings department of Federal Foundry Supply Div., Archer-Daniels-Midland Co., Cleveland. Mr. Dorfmueller joined ADM as a sales representative, later serving as specialty products manager and eastern sales manager. Mr. Schwalm formerly served as assistant sales manager of Federal Foundry Supply Co. and its San-Blo Div. Mr. Sweeney, who will be in charge of bentonite, seacoal, core wash, and other facing compounds, has been Federal's technical service manager for three years. Other appointments as a result of integration of ADM's former Foundry Products Div. with that of the sales group of Federal Foundry Supply Co., recently acquired, include: **Charles E. Coulter,** western sales manager, and **Richard Grogan,** West Coast sales manager. **George Miller** continues as sales manager, San-Blo Machinery Dept.

● **Len Wichman,** formerly district representative in the New York area, Pettibone Mulliken Corp., Chicago, has been appointed eastern regional sales manager, with headquarters in New York.

● **Archie J. Smith** has been named West Coast representative of Lake Erie Machinery Corp., Buffalo, with headquarters at 15618 Cohasset St., Van Nuys, Calif., to handle the company's line of hydraulic presses and diecasting machines.

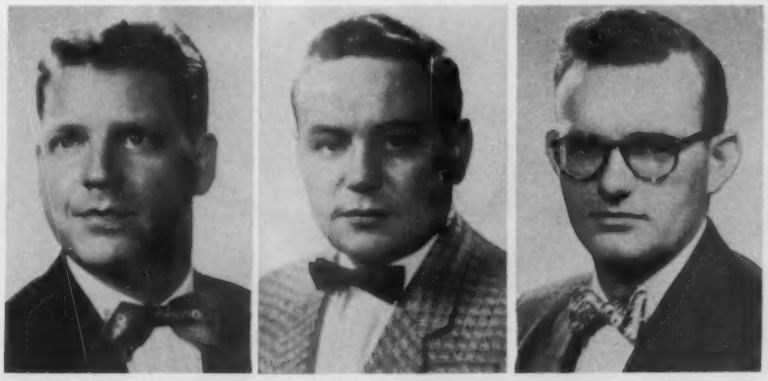
Herbert B. Moore has been appointed sales representative in Virginia, North and South Carolina and eastern Tennessee, Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp., Tonawanda, N. Y. **Charles A. Schnell** has been transferred to the Detroit area as sales representative. **William J. Hildebrand** will represent the company in Cleveland.

James L. Doyle has been appointed sales representative in the Michigan and Great Lakes area, Detroit Gray Iron Foundry Co., Detroit. He will handle sales for Detroit Gray Iron and its subsidiaries: Lansing Foundry Co., Lansing, Mich., Valley Steel Casting Co., Bay City, Mich., and Oakland Foundry & Machine Co., Rochester, Mich.

● **Douglas L. Warner** was recently named sales manager, Foundry Div., Berlin Chapman Co., Berlin, Wis. He joined the company over 10 years ago and after holding various positions in the foundry he was transferred to sales-service several years later.

Dr. Ernest R. Ramirez has been appointed research engineer, Metallurgical Products Dept., General Electric Co., Detroit, to work on the special inorganic materials project. He holds degrees from the Universities of Missouri, Montreal, and Zurich, Switzerland. Previously he conducted research on surface finishing of aluminum alloys for Reynolds Metals Co., Louisville, Ky.

Paul R. Gouwens has been named supervisor of the foundry and steelmaking section, Metals Research Department, Armour Research Foundation, Illinois Institute of Technology.



● ANTON DORFMUELLER JR. ● JAMES J. SCHWALM ● JOHN M. SWEENEY
Federal Foundry Supply Div. sales appointments

Sound planning...

...is based on an Osborn Methods Study

Today—foundry production planning *really means*—foundry *profit* planning. There's a sound reason why: operating today's foundry takes methods and machines that *must* turn out *quality* molds and cores rapidly . . . *at a profit.*

To do that job takes a special kind of planning and know-how. We call it the **O**sborn **M**ethods **S**tudy . . . it's available to *you now* at no obligation.

To lower your costs . . . speed production . . . boost foundry efficiency takes today's most advanced thinking—today's most *sound planning*. For over 50 years, Osborn has *pioneered* in developing *advanced* methods and production-tested foundry machines designed to lower your costs . . . *increase your profits.*

The time to *plan for profits* is *now*. Our full staff of Foundry Specialists is ready to work with you . . . study your molding and core-making operations . . . show you *exactly* where you can *save time and money.*

Write us for full details on how *you* can use the **O**sborn **M**ethods **S**tudy to *boost profits* in 1958. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

MEMBER FEMA

leader in mechanization for the foundry OSBORN®

Circle 619 on Page 51

MOLDING MACHINES
CORE BLOWERS
SHELL MOLDING MACHINES
BRUSHING MACHINES
INDUSTRIAL BRUSHES

MEN OF INDUSTRY

● **FRANK V. LOCKEFER**
. . . becomes sales director

● **ROBERT L. WROE**
. . . training instructor

● **JAMES L. JACKSON**
. . . Burnside Steel sales mgr.

● **FRANK K. PLATT**
. . . new regional mgr.

For 17 years he had been associated with Fahralloy Co., Harvey, Ill., where he became chief metallurgist. Mr. Gouwens was chairman of the technical research committee of the Alloy Casting Institute for two years.

● **Frank V. Lockefer** has been named director of sales, promotion, and advertising, Fairmont Ornamental Casting Co., subsidiary of Fairmont Foundry Co., Birmingham. Mr. Lockefer was formerly vice president and sales manager, Tennessee Fabricating Co., Memphis, Tenn.

Harold Schulte has been named manager-production engineering, and **Herman Kretz,** his assistant manager, Cooper Alloy Corp., Hillside, N. J. Mr. Schulte came to the company as a production engineer last year from Keokuk Steel Casting Co., Keokuk, Iowa. He will plan and develop new pattern techniques and foundry controls. Mr. Kretz, with the company since 1949, until his recent appointment was assistant to the executive vice president. He will assist Mr. Schulte in planning and process control.

Donald D. Spurr, formerly in the Detroit industrial lift truck sales and service branch, Materials Handling Div., Yale & Towne Mfg. Co., Philadelphia, has been appointed assistant gas truck sales manager for the division. Prior to joining the company's sales organization, Mr. Spurr was associated with the Department of Geophysics, Columbia University.

George T. Humphrey Jr., since 1951 assistant general manager of the service-sales division, Timken Roller Bearing Co., Canton, Ohio, has been named general manager of the division. Mr. Humphrey replaces **E. H. Austin,** who has become special representative, working for the director of sales and the vice president-sales.

● **Robert L. Wroe** has been appointed an instructor in the Training Center, Foxboro Co., Foxboro, Mass., where he will furnish bench instruction and lecture on mechanical instruments in the temperature and pressure measurement fields. He was formerly in charge of accessories promotion with the company's service and repair division.

● **James L. Jackson** was recently appointed sales manager, Burnside Steel Foundry Co., with headquarters at the home office in Chicago.

Dr. J. E. Hurst, deputy chairman and managing director, Bradley & Foster Ltd., Darlaston, England, recently retired because of health reasons. After service with a number of companies as a metallurgist, he became technical adviser to Bradley & Foster in 1926, technical director in 1934, managing director in 1949, and deputy chairman in 1952. He is a past president of the Institute of British Foundrymen and the British Cast Iron Research Association.

Edgar F. Dunn has been appointed Buffalo sales manager, Whitehead Metal Products Co., New York. He joined the company's sales force in 1946 after an association with International Nickel Co., Port Colborne, Ont. **Robert B. Kent,** since 1951 in the New York office of Whitehead, specializing in hydraulic component sales, has been made manager of the company's special products department.

Theodore H. Booth has been named president-treasurer, Frontier Bronze Corp., Niagara Falls, N. Y., succeeding **Ernest H. Holzworth,** who resigned after 31 years in that position. Mr. Booth was formerly vice president, Bonded Abrasives Div., Carborundum Co., there. Previously he was vice president-manufacturing, Walworth Co., New York.

● **Frank K. Platt,** until recently president, Air Engineering Co., Kalamazoo, Mich. has been named central regional manager, American Air Filter Co., Louisville, with headquarters in Detroit. **L. B. Mason** has succeeded Mr. Platt at Air Engineering Co.

T. F. Kaveney has joined the sales department, Electro Metallurgical Co., Div. of Union Carbide Corp., New York, and has been assigned to the electric furnace section of the metallurgical service division in Cleveland. A graduate of Massachusetts Institute of Technology, he was formerly a metallurgist with Allegheny Ludlum Steel Corp., Pittsburgh, and the former Northeastern Steel Corp., Bridgeport, Conn. **J. R. Vogt** has joined the company's sales department as a metallurgical service representative in the nonferrous section, Cleveland. He was graduated from Lawrence Institute of Technology and was formerly plant metallurgist of the castings division, Bohn Aluminum & Brass Corp., Detroit.

J. Niel Laidler, since 1950 plant manager of General Motor's Fabricast plant in Malvern, Ark., has retired, after 33 years of service with the company. He transferred to the Fabricast Div. in 1945 and was responsible for much of the planning and layout of the Jones Mills plant in Arkansas. Mr. Laidler attended Manitoba University School of Engineering and in 1925 went to Anderson, Ind., with Delco-Remy Div., GMC. He was transferred to Bedford, Ind., in 1946 as assistant manager of the Fabricast plant there before going to Arkansas.

W. P. Wright, assistant sales and production manager, Hansell-Elcock Co., was named the new chairman of Chicago Area Management Executives Group, Gray Iron Founders' So-

In our 50 years of manufacturing dispersions of colloidal graphite, we've seen the unique anti-friction properties of this basic material make lubricating problems disappear as if by "black magic". As an additive to lubricating oils and greases, as a parting agent in many kinds of casting and as a dry-film lubricant in diverse fields of metal working . . . in application after application . . . it has proved literally more valuable than gold.

Dr. Edward Goodrich Acheson's invention of colloidal graphite over 50 years ago has been followed by a constantly expanding program of fundamental research and product development. Today, with over 50 different dispersions already in use, three laboratory groups at Acheson are pressing toward perfection of whole new families of dispersions and their applications.

The custom dispersing of solids requires specialized facilities and production techniques. Why not take advantage of Acheson's 50 years of leadership in this field?

You will be interested in the number of different dispersed solids, in addition to graphite, that are being used successfully today in industry. Our Products List gives you, in quick-reading chart form, a résumé of Acheson 'dag'® brand dispersions and their typical applications. Send for your copy. Address Department F-28.

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Circle 620 on Page 51

● KENNETH L. MOUNTAIN
. . . FOUNDRY district mgr.

● GEORGE P. KRUMLAUF
. . . assistant to sales mgr.

● J. J. OFFUTT
. . . becomes sales v. p

ciety, succeeding **Walden G. Greenlee,** president, Greenlee Foundries Inc. **Harold W. Johnson,** Wells Mfg. Co., Skokie, Ill., has been named vice chairman of the group and **C. V. Adams,** secretary, Vulcan Iron Works Inc., was re-elected secretary.

● **Kenneth L. Mountain** has been appointed district manager of FOUNDRY in the Ohio territory, where he will be associated in advertising sales with **A. L. Klingeman,** senior regional manager, and **E. H. Thomas,** regional manager. Mr. Mountain was graduated from Ohio State University in 1949 and immediately joined FOUNDRY as readers' service and circulation manager. In 1950 he returned to Ohio State in an administrative capacity with the Student Union. He rejoined FOUNDRY as an assistant editor in 1954 and was made an associate editor in 1955.

T. E. Ward has retired as president-general manager, Badger Malleable & Mfg. Co., South Milwaukee, Wis., after 30 years with the firm. His son, **James E. Ward,** formerly in sales, has been named executive vice president to head the company, which is a division of Mueller Industries Inc., Aurora, Ill. **W. J. MacNeill,** vice president-operations, will have charge of all manufacturing activities of the company.

Ivan W. Dyer, former development engineer, American Air Filter Co., Louisville, has joined Earl W. Graham Co., Detroit, as field sales engineer. The Graham company represents AAF, for whom Mr. Dyer has worked since 1948.

Maurice W. Acre has been appointed manufacturer's representative, E. V. Nielsen Inc., Stamford, Conn., to represent the company in the West and Southwest. Mr. Acre established his own company in Los Angeles two years ago and previously was associated with Portornag Inc., Ferndale, Mich., and Skil Corp., Chicago.

● **George P. Krumlauf,** for the last five years metallurgical engineer, Pig Iron & Coal Chemicals Div., Republic Steel Corp., Cleveland, was recently appointed assistant to the division's sales manager. Former connections include: Chief metallurgist, Hamilton Foundry & Machine Co., Hamilton, Ohio, foundry superintendent and metallurgist, Altens Foundry & Machine Co., Lancaster, Ohio, and research engineer, Battelle Memorial Institute, Columbus, Ohio.

A. E. Williams, since 1949 sales manager, Vitrified Div., Robinson Clay Product Co., Akron, Ohio, has been named general sales manager, succeeding **R. A. Ferreira,** resigned. **P. V. Robinson Jr.,** resident manager in Rochester, N. Y., has replaced Mr. Williams. **Edward B. Mogenhan** has been named Rochester branch resident manager. Mr. Ferreira was with the company for 32 years.

FOUNDRY Index Is Ready

Index to FOUNDRY, Volume 85, listing by title, subject matter and author the editorial material published during 1957, is ready.

Readers find the index a handy reference to various phases of foundry practice, new techniques and recent developments in the industry and a quick means of locating information published during the year.

Readers may obtain copies without charge by directing requests to FOUNDRY, Penton Building, Cleveland 13, Ohio.

● **J. J. Offutt** has been elected vice president-director of sales, A. P. Green Fire Brick Co., Mexico, Mo. Associated with the company for about 30 years, he has been engaged in mining, research laboratory, sales engineering, sales promotion, plant engineering, and supervisory activities during that time. In 1946 he became general manager of the company's Canadian plant in Toronto, returning to the Mexico office in 1954. **A. R. Barnett,** has been named director of the company's subsidiaries including Canada. He has been with the Green company for 34 years, serving as an executive in manufacturing, shipping, finance, and sales.

Ralph H. Waddington, James C. Parlee, Richard A. Cabell, and **Paul Queneau** have been elected assistant vice presidents, International Nickel Co. of Canada Ltd., Toronto, Ont. Mr. Waddington has also been appointed general manager of the parent company's Ontario Division and Mr. Parlee, general manager of its Manitoba Division. Messrs. Cabell and Queneau have been elected also as vice presidents of the American subsidiary, International Nickel Co., New York.

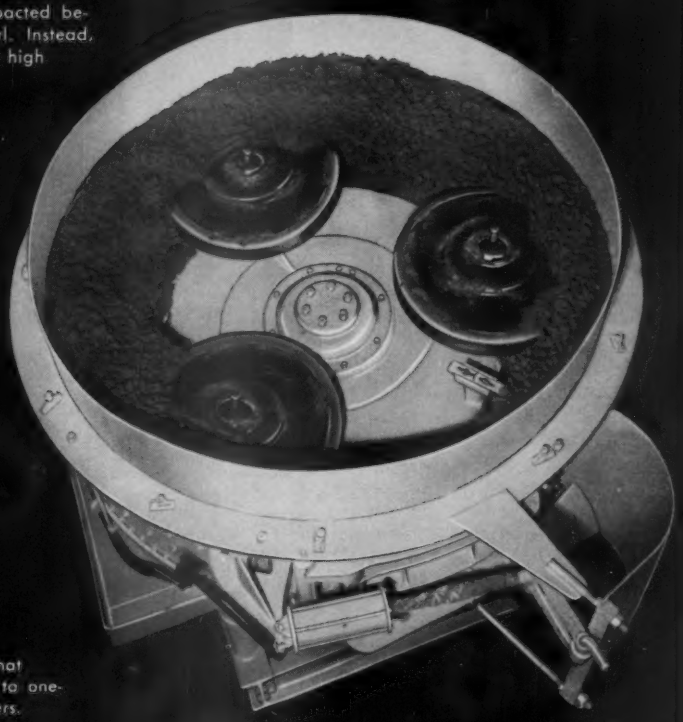
Samuel L. Hoff has joined International Graphite & Electrode Div., Speer Carbon Co., St. Marys, Pa., as development engineer. Recently he was engaged in process research and development at Columbia Mineral Beneficiation Laboratory, New York.

Thomas Buckley and **D. E. Fenton** have been appointed sales representatives in Indianapolis and Youngstown, Ohio, respectively, Allis-Chalmers Industries Group, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Buckley attended Marquette University and Mr. Fenton the University of Cincinnati, prior to joining the company recently.

Why buy a mullor that won't aerate?

only the **SPEEDMULLOR** aerates as it mulls!

- In the Speedmullor, the sand is not compacted between heavy steel wheels and steel bowl. Instead, sand is fluffed and aerated *as it is mulled* high on the side of the rubber lined bowl.
- Sand is mulled between rubber tired wheels and rubber lined bowl . . . no sand grain crushing . . . perfect squeezing and kneading mulling action. Another Speedmullor exclusive.
- Precise control of mulling pressure through scientifically applied centrifugal force — no dependence on hard-to-adjust springs where as little as ¼-inch misadjustment will mean an 800 pound pressure error.
- Highest hourly capacity with far higher production per mullor dollar, yet smaller batches that can be handled by far less costly hoppers, conveyors, elevators, etc.
- Need cooling? Only the Speedmullor provides modern *through-the-batch* air cooling . . . doesn't merely blow air over the hot sand mass.
- Fast discharge required? The Speedmullor's centrifugal mulling and side discharge mean that discharge can be accomplished in one-third to one-fifth the time required by old style mixers.



HOURLY CAPACITY — FULLY MULLED AND AERATED SAND

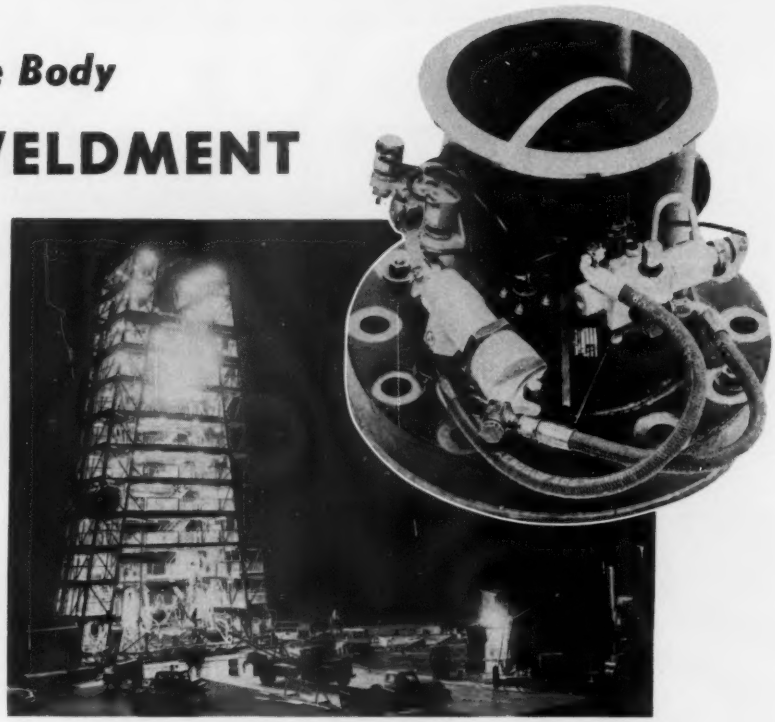
Speedmullor Model	Hourly capacity of typical system sands not requiring cooling	Hourly capacity of typical core sands, facing sands, or hot system sands requiring cooling
Model 80A	76 tons per hour	38 tons per hour
Model 70A	58 tons per hour	29 tons per hour
Model 60A	38 tons per hour	19 tons per hour
Model 50A	29 tons per hour	14½ tons per hour
Model 40A	19 tons per hour	9½ tons per hour
Model 30A	13 tons per hour	6½ tons per hour

Write now for Bulletin No. 1220.
Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 N. Cicero Avenue, Chicago 39, Illinois.

Circle 621 on Page 51

Cast Stainless Valve Body

REPLACES WELDMENT IN MISSILE



Top right, butterfly valve with cast stainless body is installed in a high-pressure gas line and used in conjunction with the Atlas intercontinental ballistic missile. Shown below is an Atlas missile test tower

A CAST stainless valve which is now in use with the Atlas intercontinental ballistic missile, has met rigorous Air Force specifications, at a cost 30 per cent less than that of the original weldment design. Even more important, the casting design has overcome objectionable features inherent in the weldment.

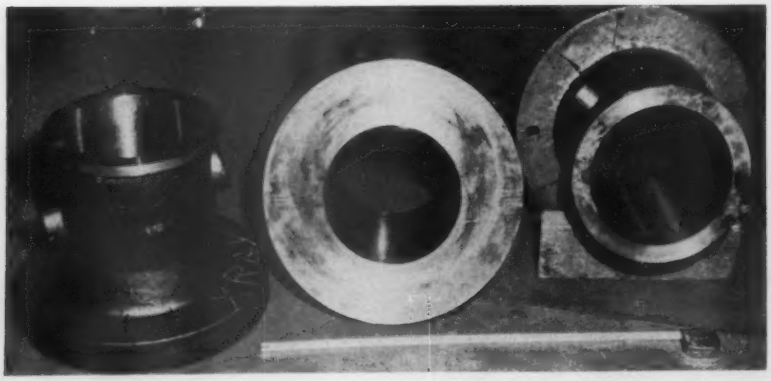
Working under contract to the Air Force, Convair-Astronautics, San Diego, Calif., employs the valve in a line running to a high-pressure gas tank. By shutting the valve, the line below it can be cleaned without depressurizing the tank. In this service, the valve and valve body are exposed to corrosive materials at temperatures ranging from very low to that close to boiling water. In addition, the valve is subjected to gas pressures of 150 psi and considerable mechanical shock.

Weldment Unsatisfactory—As originally designed, the valve consisted of welded wrought stainless steel flanges and tubes. From both the economic and engineering points of view, however, this design was unsatisfactory. First, machining and welding costs would be very high; second, since weld zones are susceptible to intergranular corrosion, mechanical failure was a possibility. Furthermore, the welded seams offered an opportunity for gas leakage, and it was feared that they might not withstand the severe mechanical shock.

To overcome these objections, and to achieve a better appearance, it was decided to redesign the valve body as a stainless casting. The Interstate Engineering Corp., El Segundo, Calif., designed the new valve to incorporate a centrifugally cast one-piece steel valve body. As a result, not only were the neces-

Multiple casting centrifugal "stick" after removal from mold. Six of the bodies are produced at one time, thus reducing unit production cost

One-piece valve bodies made of type CF-8 stainless alloy after parting from the centrifugal "stick." Each body weighs about 180 lb as cast



How can you bear being up a tree?

Do SNAGGING PROBLEMS have you in a bearish mood? Or maybe you're out on a limb because of wasted snagging time in your cleaning room. Or perhaps you're growling because of high snagging costs. Then it's high time to switch to CINCINNATI (PD)° SNAGGING WHEELS—the greatest grinding development in years.

Customers all over the Nation report that the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS really cuts snagging time . . . and thus saves money.

Our customers report, too, that POSITIVE DUPLICATION (PD) means *another* savings. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and nonferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

For the bare, down-to-earth facts on how to save money on snagging and increase production, contact your CINCINNATI Grinding Wheels distributor. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

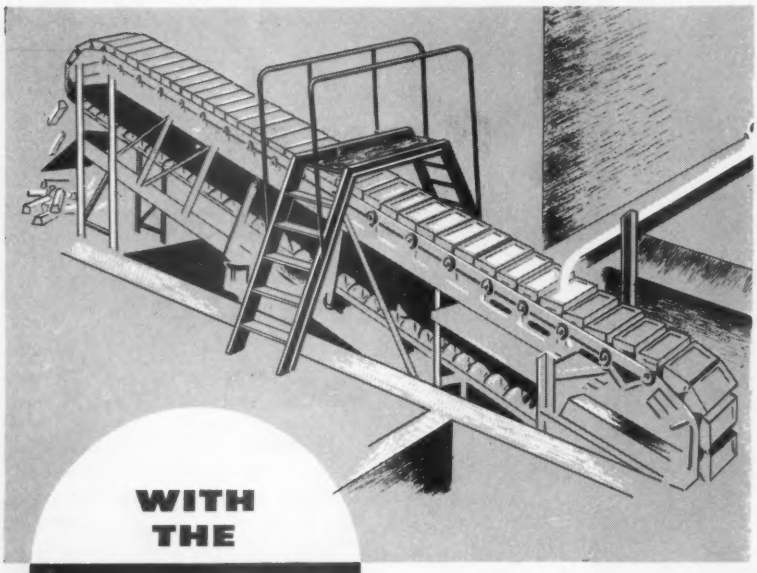
CINCINNATI°
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

Circle 622 on Page 51

Simplify Pig Casting Operations . . .



WITH THE

Bailey

PIG CASTING MACHINE

- 80% of moving parts eliminated by stationary wheel design
- Capacities from 3 to 50 tons per hour
- Lengths: 15 to 125 feet, in multiples of 5 feet

The unique "stationary wheel" design greatly increases service life and pig casting economy for foundries and small metal producing plants. With this design the roller bearing idler wheels are mounted on the frame rather than on the moulds— thus keeping them far as possible away from hot metal.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

sary mechanical properties and improved appearance achieved, but Interstate reports an over-all saving in time and material of 30 per cent of previous costs.

Stainless Alloy Selected—In selecting a suitable cast alloy, the designers had available to them about 20 Alloy Casting Institute designated types in the corrosion-resistant category. Type CF-8 (corresponding to wrought type 304)—with 19 per cent chromium, 9 per cent nickel, and a maximum of 0.08 per cent carbon—was chosen. This alloy, in addition to providing excellent resistance to corrosion by oxidizing media, has exceptionally good shock resistance (impact strength) at subzero temperatures.

Produced by an ACI member foundry, the valve bodies were made by a modified centrifugal casting technique which easily permitted the casting of six 180-lb valve bodies at one time, thus decreasing the production cost per unit. Because of the one-piece cast design, the danger of gas leakage is practically eliminated.

Before the valve was installed, it was tested in a wide range of temperatures and mechanical conditions. In its test program, Convair-Astronautics subjected the valve to temperatures ranging from −65° F up to nearly 500° F. It was also tested for mechanical strength at 2000 vibrations per second and at a stress equal to 15 times the pull of gravity. Engineers of Convair-Astronautics report that the valve performed satisfactorily under these extreme conditions.

ASM Offers Training Courses On Various Metals Subjects

A series of 39 home-study and in-plant training courses is being offered by the Metals Engineering Institute, a division of the American Society for Metals, Cleveland. These courses will offer up-to-date material on various phases of the metals industry. They are available on either an individual, home-study basis or to training directors and other administrative personnel who wish to use them for on-the-job or in-plant training.

Three of the 39 courses are available currently. They include Elements of Metallurgy, Heat Treatment of Steel, and High-Temperature Metals. Each is a 15-lesson course, and all are prepared by well known authorities in the respective fields.

For further information, write to Metals Engineering Institute, 7301R Euclid Avenue, Cleveland 3, Ohio.

Shell molders

COAT YOUR OWN SAND UP TO 3000 LBS/HOUR WITH THE ALL-NEW MIXALL

Available in MANUAL, SEMI-AUTOMATIC, FULLY AUTOMATED models

PATENT PENDING

Write now for NEW BULLETIN CS-806

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C&S PRODUCTS CO., INC.

AFFILIATED WITH

Barber-Greene B-G

18656 FITZPATRICK

DETROIT 28, MICHIGAN

Circle 624 on Page 51

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

INVESTIGATION of "Inverse Greyness in Malleable Cast Iron" by C. T. Moore, and reported in the October, 1957, issue of the BCIRA *Journal of Research and Development* (Birmingham, England), points out that this phenomenon is particularly likely to occur in thin sections attached to thick sections in castings.

Variations in C, Si, Mn and S contents which encourage the presence of normal mottle, increase the incidence of inverse grayness. Increasing amounts of aluminum added to the ladle caused an increase in inverse grayness and also in normal mottle in test castings. Increasing pouring temperature increases tendency for inverse grayness to occur, and that has not generally been associated with an increase in normal mottle.

It is suggested that inverse grayness occurs as a result of variations in the relative cooling rates in different parts of the casting. It is believed that a necessary condition for inverse grayness is an initial relatively rapid cooling rate followed at a critical time by a relatively slow cooling rate.

Withstands Wear

REPORTED to combine the best properties of austenitic manganese steel and martensitic white irons, an alloy cast iron developed by Meehanite Metal Corp., New Rochelle, N. Y., soon will be available for applications for resistance to wear and abrasion. Called Almanite, the iron is said to require no strategic materials, and to have a structure similar to heat treated steel, possessing a good combination of hardness, strength, and resistance to impact. One type has a tensile strength of 90,000 psi with a ductility around 15 per cent.

Water Affects Strength

INVESTIGATION on "Tensile Properties of Pearlitic Nodular Irons in Air and Water" by G. N. J. Gilbert, reported in the June issue of the *Journal of Research and Development* (British Cast Iron Research Association, Birmingham, England) shows that the strengths and elongations of normalized pearlitic nodular irons are reduced substantially in water. Strengths of as-cast pearlitic nodular irons also are reduced in water but not generally to the same extent.

Only when an as-cast iron develops unusually good tensile properties at room temperature in air is the strength reduced substantially in water. Elongations of as-cast irons only are reduced substantially in water when the irons develop optimum properties at room temperature in air. This apparent reduction in strength in water of pearlitic nodular irons appears to be a phenomenon similar to that reported by Benedicks and Rubens for hardened and tempered steels whose strengths were reduced when tested in water.

Speeds Production

PRODUCTION process which cuts manufacturing time of industrial carbon products from eight weeks to less than eight minutes now is in operation at the Lawrenceburg, Tenn., plant of National Carbon Co. Div., Union Carbide Corp. Process is a highly automated, two-step method which forms carbon products to shape in giant hydraulic presses while high electrical currents simultaneously heat them to baking temperature. Pressures of several tons per square inch, and low-voltage electrical currents from 3000 to 100,000 amperes to generate temperatures around 2000° F are employed in the equipment. Initially the new process will be used to manufacture carbon brick for furnace linings, with later extension to carbon brushes for motors and generators, large carbon blocks, etc.

Determines Gas Content

HIGH-VACUUM, all-glass resistance furnace adapted to the inlet of a conventional mass spectrometer has been developed at Watertown Arsenal. It is reported to have much better capabilities than other methods for determining gaseous elements in metals. Described in report PB 131121 "High Vacuum Filament Furnace for Gas Analysis of Metals," the furnace is said to permit much closer control of temperature, simpler operation, and economical installation. The report, price 50 cents, may be obtained from Office of Technical Services, Department of Commerce, Washington 25.

Cleans Brass Castings

USE of cob grits to remove molding and core sands from brass castings has reduced blast cleaning costs considerably at Indiana Brass Co., Frankfort, Ind., according to Delmar Johnson, vice president. Complete removal of sand is said to be achieved, leaving the castings with a clean, satisfactory surface. The cleaning is done in an airless blast machine adjusted for the difference in weight of other cleaning media. The volume of cob grits used is reported to be no greater than the blast material previously used, and parts wear and maintenance expense on the cleaning machine has been minimized.

Elastic Properties

FINAL report of a 6-year study of dynamic elastic properties of solids, released by the Office of Naval Research, is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25. The research was concerned primarily with determination of elastic modulus and internal friction under pressure with alternating stresses. It included measurements on metals, mostly single crystals, and on plastics and elastomers. Report is PB 121701, and the price $3.

Reduces Test Expense

PRODUCTION of high-quality tensile test specimens to final dimensions to eliminate the expense of casting the conventional keel block and machining of specimens is described in a recent report issued by the Office of Technical Services, Department of Commerce, Washington 25. It is designated PB 131120 "Precision Investment Cast Tensile Tests of Low Alloy Steel." It gives the details for making 0.357-in.-diam specimens 2 in. long which provide results comparable to those from standard test bars.

GAMMA RADIOGRAPHY

LOW COST . . . LIGHTWEIGHT . . . PORTABLE . . . SAFE

SPECIFICATIONS

Weight . . . . 40 pounds

Capacity . . . up to 30 curies of Iridium 192

Working Distance . . . 50 feet from operator to exposed source.

Machine . . . lead shielded, stores source when not in use.

Uses . . . . . ¼ inch to 3 inches of steel (or equivalent)

The Model 40 Iriditron is an extremely portable isotope radiography machine designed for the remote handling of Iridium 192 in industrial radiography.

It is especially designed for tne kind of exposures which cannot be handled conveniently with X-Ray equipment . . . panoramic shots of several specimens arranged around the source and radiographed simultaneously . . . internal shots such as circumferential and longitudinal welds in boilers and pressure vessels.

Call on Nuclear Systems for your radiography equipment needs. Company offices in Philadelphia, Chicago and San Francisco. Sales representatives in principal cities.

NUCLEAR SYSTEMS

A DIVISION OF THE BUDD COMPANY, Philadelphia 32

Budd

Circle 637 on Page 51

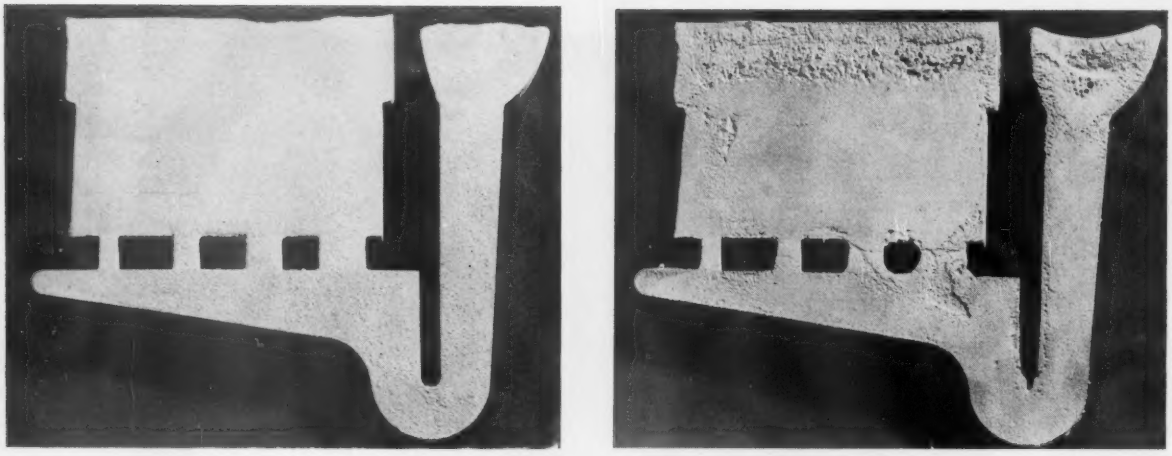


Fig. 1—Low-carbon steel castings were poured (left) in forsterite grain shell mold with 5 per cent resin and (right) in silica sand with 5 per cent resin

FORSTERITE

Offers Advantages as

SHELL MOLD MATERIAL

By W. H. OWEN
Harbison-Walker Refractories Co.
Pittsburgh

WHEN steels or alloys which melt at high temperatures are cast into resin-bonded silica sand shell molds, discontinuities in the casting surface frequently occur.

These imperfections seemingly are caused by gas formed by decomposition of the resin binder, which "blows" from the mold into the freezing metal while it is still in a critical state of solidification. Accordingly, the thinner parts of the casting which soldify early, before gas begins to be liberated from the resin, will show no surface imperfections, whereas heavier parts, which solidify later, may show "blows" on their surfaces.

Surface imperfections from gas blow are inhibited when using resin-bonded shell molds made of forsterite grains for the casting of low-carbon or low-alloy steels as illustrated in Fig. 1.

This inhibition appears to be related to the rapid chilling of the surface skin of the metal by the forsterite with the development of sufficient strength in the skin of the casting to resist outside gas pressure as well as inside ferrostatic pressure.

The use of Harbison-Walker forsterite material in resin-bonded shell molds was developed under the spon-

Fig. 2—Thermal expansion of forsterite is unlike that of quartz—particularly at more than 1100° F

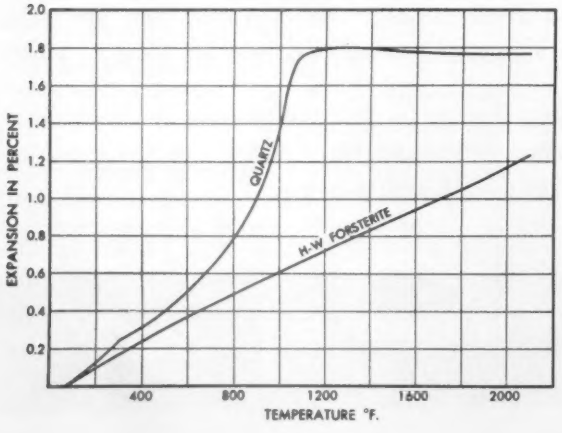
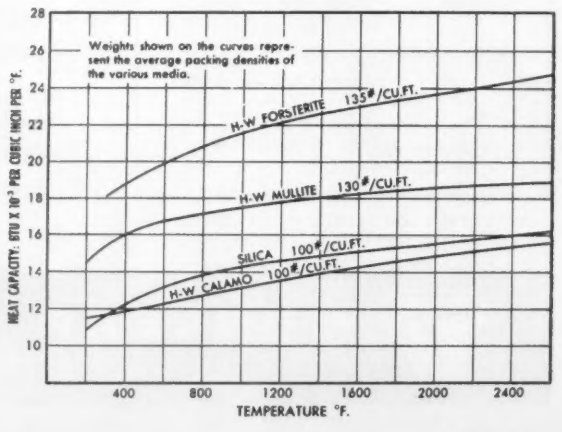


Fig. 3—Chart shows approximate volumetric heat capacities of forsterite, mullite, silica, and calamo



Circle 617 on Page 51→

LOADS 2 CU. YDS. PER PASS

quicker...easier... at less cost per yd.

For big yardage production, no other crawler in its class can match the combination of power, speed and maneuverability you get with the new *2 cu. yd.* Case® TerraTrac® Model 1000 tractor-shovel. It not only gets bigger loads faster . . . it also turns and maneuvers faster with a new *COUNTER-ROTATING* Terramatic transmission that drives one track *forward* and the other track *reverse* at the same time.

Exclusive "Knock-out" dumping action cleans bucket instantly of stickiest material, while extra-high (9'6") clearance lets you back away from big trucks or hoppers without stopping to raise bucket. You also get *exclusive torsion-bar track suspension, automatic track roller lubrication,* PLUS many other advanced features that will increase your production, cut your costs.

See this revolutionary higher-speed 2 cu. yd. rig now at your Case Industrial Dealer's, or mail coupon for catalog and free eye-opening demonstration.

Torque-Converter Drive

Ordinary Drive

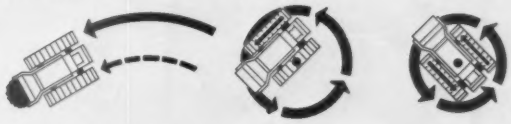
100 HP Diesel plus torque-converter drive

Develops up to 24,000 lbs. of "crowding-power" for digging hard materials. Converter automatically balances tractor speed to changing loads . . . eliminates clutching and gear-shift guesswork . . . keeps engine and hydraulic pump operating with maximum power at all times.

Power-Turn

Brake-Turn

Spin-Turn



Instant power-shift with 3-way power-steer

Enables you to change speeds or directions "on-the-go", without stopping to shift gears. Easy-working hydraulic controls let you turn and maneuver full loads easier — with power and traction on both tracks.

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☐ Send catalog on new 2 cu. yd. tractor-shovel

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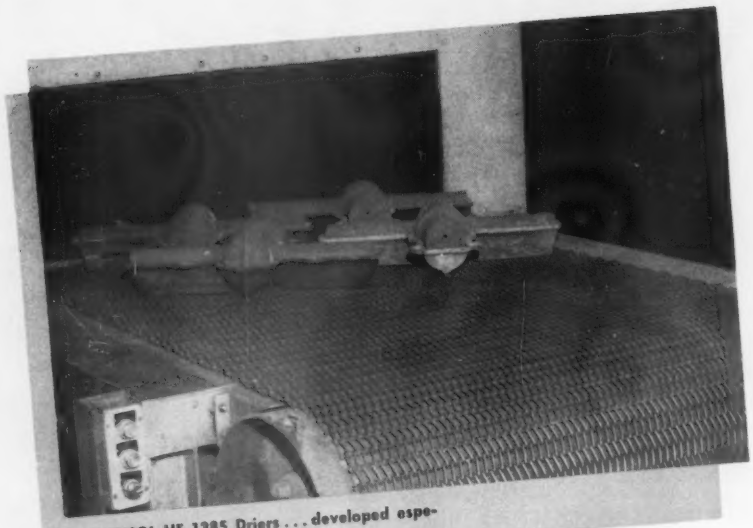

HYSOL HF 1385 Driers . . . developed especially for use with dielectric ovens.

HYSOL DIELECTRIC CORE DRIERS . . .

The NEW proven liquid epoxy HYSOL HF1385 for casting durable core driers

- ECONOMICAL
- CASTABLE
- TIME SAVING
- EASY TO USE

HYSOL HF 1385 was developed by Houghton Laboratories jointly with Lebanon Steel Foundry for use in dielectric ovens. It is an entirely new approach to the problems involved of dielectric baking irregularly shaped cores.

HF 1385 is completely adaptable to any shape and form required without expensive tooling and the finished product is ready for immediate use without modification of any kind.

Get the full details on HYSOL HF 1385 in Houghton Laboratories Technical Data Bulletin Number T27. Write today

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sorship of the Steel Founders' Society of America.

Properties of Forsterite—The excellent benefits resulting from use of forsterite grains for shell molding are attributable to its mineral composition, desirable physical and thermal properties and optimum grain sizing. The mineral composition is predominantly forsterite or magnesium othosilicate, $2MgO.SiO_2$.

One of the most important properties of the material is the uniformity of its thermal expansion curve which is practically a straight line up to temperatures above 2000° F. Quartz sand, on the other hand, has a relatively high rate of expansion up to 1100° F, with no further expansion between 1100° and 2100° F. As

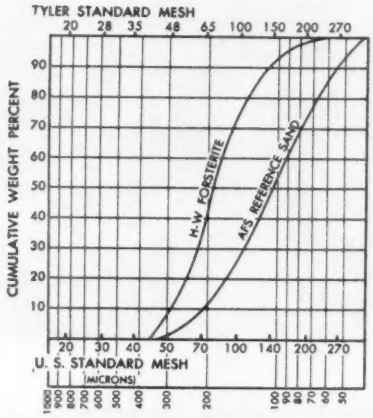


Fig. 4—Comparison of typical screen analyses of forsterite grains and of AFS reference sand for shell molding

shown in Fig. 2, forsterite at 1200° F has only about one-third of the thermal expansion of quartz.

Another useful property of forsterite grains for this service is its high capacity for heat storage. The grains and resin binder compact to a bulk density of about 135 lb per cu ft, compared with about 100 lb for silica sand with resin binder. If the two materials had the same specific heats, the forsterite grain mixture would have 35 per cent greater heat-storage capacity than the silica sand mixture per unit of volume. As shown in Fig. 3, test data indicate that the approximate heat storage capacity of the forsterite grain mixture is somewhat greater than this, presumably because of higher specific heat than that of silca.

Forsterite materials for shell molding are available in the form of (1) grains, (2) 100-mesh flour, and (3) 200-mesh flour. The grains are ground so that the greater part of the material will be retained on three consecutive screens, with 100 per cent

passing 40-mesh and 3 per cent maximum passing the 200-mesh sieve. Forsterite flour, 100 mesh, is ground to have 35 to 50 per cent retained on a 200-mesh screen and 65 to 50 per cent pass a 200-mesh screen. Forsterite flour, 200 mesh, is ground to such a fineness that 95 per cent will pass a 200-mesh screen.

Fig. 4 shows the relative coarseness of typical H-W forsterite grains compared with that of the AFS reference sand for shell molding. Since experience shows that forsterite grains have greater chilling effect than silica, fineness of grain size is not as important with this material as with silica sand for producing smooth surfaces of steel castings poured at normal temperature.

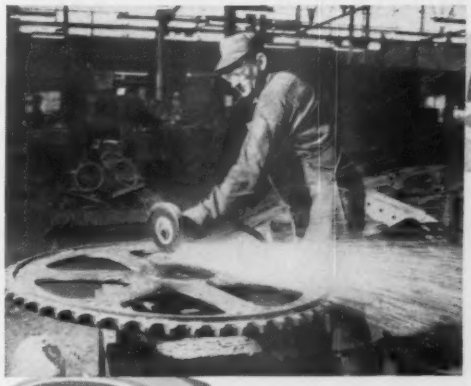
When pouring temperature of the steel must be higher than normal and slight metal penetration into the mold might occur, the forsterite flour, 100 or 200 mesh, may be added to the mix to "close up" or reduce the size of the pores in the shell mold surfaces.

Preparation and Use — Suggested practice for preparing forsterite grains mix for shell molding of steel is as follows:

1. Pre-mix the dry grains in as large quantities as practicable, in order to obtain most homogeneous mixtures, with a minimum of segregation of fine or coarse particles.
2. Add and mix a wetting agent as recommended by the resin supplier. Mixing should continue until the wetting agent is uniformly distributed throughout the mass of material.
3. Add and mix phenol resin of the type and in the amounts recommended by the resin supplier.
4. If possible, use somewhat higher than normal pattern temperatures to insure melting of the powdered resin and complete the coating of the forsterite grains.
5. The most advantageous pouring temperature for low-carbon steel is between about 2900 and 3000° F.

"His Mother insisted he do his practicing where it wouldn't disturb anyone!"

There is a difference



Regardless of your abrasive needs—coated abrasives, grinding wheels, honing stones, abrasive grain—Mid-West, with its modern facilities, vigorous research and development and trained abrasive engineers is your one sure source for complete satisfaction.

and progressive thinking makes the difference

MID-WEST QUALITY ABRASIVES

MID-WEST ABRASIVE CO.
510 S. Washington St., Owosso, Mich.

Circle 629 on Page 51

the RELIANCE FOUNDRY CO., Cincinnati, reports:

"Our savings in time and materials offset over 50% of the cost of KOPESEAL® cope and drag sealer."

"In the old days," says F. E. Hutchinson, vice president of The Reliance Foundry Co., Cincinnati, Ohio, "we sealed our copes and drags by rolling out mud balls to the desired diameters and lengths. This antiquated method is now taboo since we were introduced to KOPESEAL, which makes a very uniform seal of the molds.

"Our savings in time and materials offset better than 50% of the cost of KOPESEAL. In addition, it makes molder helpers available for other work. Also, we always know we have the correct diameters for various sizes of molds at hand when needed. Parting readily adheres to KOPESEAL, adding to the tightness of the sealing of molds.

"Since using KOPESEAL, we have practically eliminated 'runouts', which, of course, are both costly and hazardous."

Hundreds of other foundries have switched to KOPESEAL for more effective cope and drag sealing . . . in *less* time . . . at *less* cost!

PRESSTITE Sealing Compounds

PRESSTITE - KEYSTONE ENGINEERING PRODUCTS COMPANY

K A P

A DIVISION OF AMERICAN-MARIETTA COMPANY

3766 Chouteau Avenue St. Louis 10, Missouri

KOPESEAL® cope and drag sealer

precision sealing for precision casting, eliminates runouts, replaces mud or dough rolls!

- **Convenient, ready-to-use right from the carton!**
- **Uniform extruded diameters from 3/16" to 3/4", in 30" lengths!**
- **Excellent compressibility eliminates runouts!**
- **Positive seating permits accurate measurement of metal thickness!**
- **Self-dissipating. No residue to worry about... use it, seal it, forget it!**

FOR A SELF-PROVING SAMPLE, CONTACT YOUR DISTRIBUTOR:

Frederic B. Stevens, Inc.....Detroit, Mich.
Branches in Buffalo, N. Y. • Indianapolis, Ind.
New Haven, Conn.

M. A. Bell Company.....St. Louis, Mo.
Branch in Houston, Texas

The Hubbard Company.....Los Angeles, Calif.
Branch in San Francisco, Calif.

H. D. Fowler Co. Inc.....Seattle, Wash.

A. J. Varnon, Jr.....Birmingham, Ala.

Railway and Power Engineering Corp., Ltd.
Toronto, Ont.

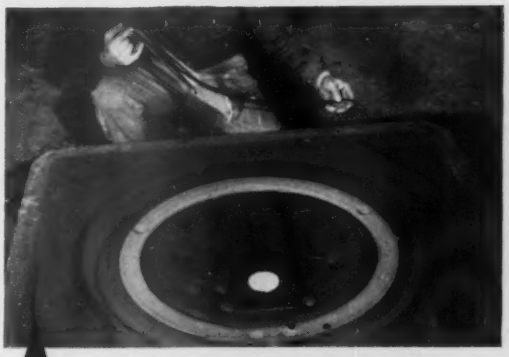
Also Stocked and Distributed Under Following Brand Names:

KOPETITE:
Toronto, Ont.—Canadian Hanson & Van Winkle Co., Ltd.

KOPEBEAD:
Philadelphia, Pa.—George F. Pettinos, Inc. • Hamilton, Ont.—Geo. F. Pettinos (Canada) Ltd. • Montreal, Que.—Geo. F. Pettinos (Canada) Ltd.
Kansas City, Kans.—Canfield Foundry Supplies.

KOPEROPE:
Harrison, N. J.—Springfield Facing, Inc. • Milwaukee, Wisc.—Milwaukee Chaplet & Supply Corp.

FOR A CONVINCING SAMPLE Contact your distributor



1 Beads of KOPESEAL, easily peeled from special paper backing, are placed on the drag prior to checking for correct cope seating. No mess, no mixing or forming.

2 KOPESEAL forms a continuous, uniform gasket-like seal around inside perimeter of the drag, preventing runouts when metal is cast.

3 Parting compound is dusted over KOPESEAL and the drag is ready to receive the cope. Subsequent inspection of compressed KOPESEAL head will indicate whether cope is perfectly seated and permits accurate measurement of metal thickness.

PRESSTITE Sealing Compounds

PRESSTITE - KEYSTONE ENGINEERING PRODUCTS COMPANY

KAP

A DIVISION OF AMERICAN-MARIETTA COMPANY
3772 CHOUTEAU AVENUE ST. LOUIS 10, MISSOURI

Industry Briefs

A. C. WILLIAMS CO., Ravenna, Ohio, has purchased all equipment and supplies of the Wright Casting & Mfg. Co., Akron, a producer of shell mold castings. The facilities will be combined with Williams' into a new division to be known as Wright Shell Casting Div. of A. C. Williams Co. Steve Kulchar will be in charge of the new operation.

Otis Elevator Co., New York, has formed the Baker Industrial Truck Div. in Cleveland and has dissolved the Baker-Raulang Co., also of Cleveland, which has been a wholly owned subsidiary of Otis since 1954. There will be no change in operations. Eugene Caldwell, formerly president of Baker-Raulang, will be general manager of the new division, with headquarters in Cleveland.

Stephens-Adamson Mfg. Co., Aurora, Ill., is in full production at a new plant in Clarksdale, Miss. The 40,000-sq-ft facility will fabricate component parts for conveyor systems which also are produced at the company's Aurora manufacturing division. Management of the Clarksdale plant will be headed by D. R. Dolan.

Archer-Daniels-Midland Co., Minneapolis, is building a new plant at Colony, Wyo., to supply bentonite for the taconite industry. ADM reports the plant will be a pushbutton operation with the entire processing operation controlled from a central location.

Carl Mayer Corp., Cleveland builder of core and mold ovens, has moved its headquarters to 20800 Center Ridge Rd., Cleveland 16, Ohio. Phone number is EDison 3-0833.

C. & S. Products Co., Detroit, has affiliated with Barber-Greene Co., Aurora, Ill. C. & S., in addition to its line of foundry shell core and shell mold blowers, will be able to offer foundries complete material handling systems, car unloading facilities, portable conveyors, and reclaiming equipment.

United States Rubber Co., New York, is consolidating operations of one of its oldest subsidiaries, New York Belting & Packing Co., with the sales and distributing organization of its mechanical goods division. All of the company's industrial rubber products will be sold under U. S. Rubber brand names, and New York Belting's sales and operating staff of about 100 persons will be integrated with the parent firm's nationwide field sales organization.

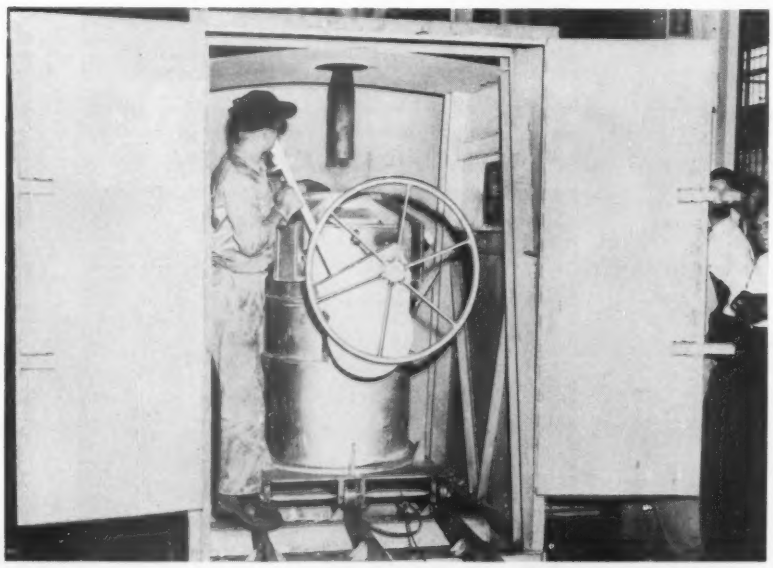
Link-Belt Co., Chicago, has opened a new district sales office, its 40th, in a new office building at 2025 Canal St., New Orleans 16, La. R. J. Tricon Co., Link-Belt's industrial distributor in the area, will continue to stock the company's products. Warren K. Guy is district manager in the new office.

Freeman Materials Handling Co., Toledo, Ohio, has been appointed franchise representative for sales and service of Yale & Towne industrial lift trucks in the Toledo area. James H. Brennan is general manager with headquarters at 501 Troy St., Toledo. Gerald B. Rusk is president.

Merger of American Metal Co., and Climax Molybdenum Co., into **American Metal Climax Inc.** has been approved by stockholders of both companies. Climax operations will be continued at its present headquarters at 500 Fifth Ave., New York.

Kramer Brass Foundry Inc., has been formed in Milwaukee with an authorized capital stock of 1000 shares of common, no par value. Incorporation papers were signed by Burton R. Vedder, 1624 North 31st St., Milwaukee.

General Vacuum Corp. has been formed in East Boston, Mass., and will concentrate initially on intermediate sizes of special high-vacuum equipment as well as on development of a line of pilot plant induction and arc melting vacuum furnaces. General Vacuum will perform engineer-



SEALED LADLE INOCULATION: A promising method for more economical production of ductile iron recently was demonstrated at the Mount Vernon, Ohio, foundry of Cooper-Bessemer Corp. More than 300 representatives of organizations licensed to produce ductile iron castings saw the demonstration. In the past, most ductile iron has been produced in this country by pouring molten base metal over master alloy in another ladle. This method results in considerable loss of magnesium and the associated metals in the master alloy. In the new method, known in Europe as the Schuchtermann & Kremer-Baum, or S-K-B, process, pure magnesium is added to the molten iron in a sealed ladle. No magnesium is lost, and no associated metals are used

(PATENT APPLIED FOR)

NEW

MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK far surpasses ordinary safety features such as anchor bushings, safety rings, special hub mountings, or revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-752

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

ing, development, testing and sales functions, and arrangements have been made for Artisan Metal Products Inc., Waltham, Mass., to fabricate equipment to General's design.

Harvey Aluminum is the new corporate name of Harvey Machine Co., Torrance, Calif., primary producers of aluminum pig, ingot, and billets. Executive offices are at 19200 South Western Ave., Torrance, Calif.

Republic Steel Corp., Cleveland, has appointed Bode Finn Co., 2650 Spring Grove Ave., Cincinnati 14, Ohio, and 1820 Frebis Ave., Columbus 6, Ohio, to handle sale and distribution of its material handling equipment.

Utility Trailer Mfg. Co., Los Angeles, is transferring its steel casting operations from Vernon to Industry, Calif. The company will build a 71,000-sq-ft structure at a cost of $330,000 to house the new operation.

American Foundry & Machine Co., a division of Eimco Corp., Salt Lake City, Utah, suffered fire damage estimated at $100,000 on Dec. 18. The plant was closed for more than a week.

Chino Mines Div., Kennecott Copper Corp., has closed its ball foundry at Hurley, N. M., and will purchase grinding balls from outside sources in the future.

AFS Foundry Show To Feature Operating Equipment Exhibits

Space applications for the Foundry Show to be held in Cleveland Public Auditorium concurrently with the 62nd AFS Castings Congress, May 19-23, already assure a show as large as that held at Atlantic City in 1956. With the continuing influx of applications, W. N. Davis, AFS exhibit manager, expects that the show will be one of the largest.

Over 250 equipment manufacturers and suppliers have contracted for space. Operating exhibits and introduction of new equipment will highlight the show. An English firm will feature an operating foundry, showing all production phases except pouring. Other exhibitors will stress equipment and supplies for molding and coremaking by the CO_2 process. A pneumatic system for transporting sodium silicate-bonded sand and a system for reclaiming the sand after use will be shown. New alloys will be introduced and vacuum melting furnaces demonstrated.

Arrangements have been made with several Cleveland area plants for visitations on Tuesday, Wednesday, and Thursday during convention week. Friday is Northeastern Ohio Day, and the Foundry Show will be open free to local plant employees.

The society's annual business meeting, featuring the Charles Edgar Hoyt lecture by W. E. Remmers, Union Carbide Corp., will be held Wednesday morning. The annual banquet is scheduled for Wednesday evening.

Malleable Conference To Treat Technical, Operating Practice

Program of the annual Technical and Operating Conference of the Malleable Founders' Society will cover a variety of plant practices. The meeting will be held Feb. 6-7 at the Wade Park Manor, Cleveland.

Among the topics to be discussed will be these:

Malleable Finishing Practice—from the standpoints of both mechanized production and jobbing shops.

Industrial Engineering — covering operations in a conventional type foundry, as well as job evaluation and operating standards in a continuous production foundry.

Malleable Engineering for the Operating Man—pertaining to metallurgical fundamentals, the meaning of mechanical properties, and relationship of practice to properties.

Molding Sand Fundamentals and Use—sand preparation, use, and control.

Malleable-Base Spheroidal Graphite Iron—process and production.

Other subjects include noise control and MFS research activities.

HOW TO DO IT

Red Lead Addition Reduces Lead Segregation in Cu-Sn-Pb Alloys

By JAMES A. REYNOLDS
Eccleston Park
Lanes County, England

Add red lead powder, not paint as shown above

IN CASTING BEARINGS with plastic bronzes containing copper, tin, and 5 to 30 per cent lead, difficulty was encountered with keeping the lead from separating out. The problem was solved by using red lead (tri-plumbic tetroxide, Pb_3O_4) in place of some of the metallic lead added to the melt. This method helps keep lead dispersed as small globules in the melt.

The globule condition can be created and maintained with red lead supplying only part of the lead content of an alloy. In the case of 80-10-10 alloy, red lead accounts for half the 10 per cent lead content. The procedural sequence is to melt the copper, add the red lead and/or metallic lead and finally the tin.

Although red lead costs more than metallic lead it was found to perform its function with greater efficiency. The price differential becomes less when consideration is given to the fact that many operators who use metallic lead additions exclusively also add 1½ to 2 per cent nickel to the melt to keep the lead from separating out.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

If you asked UNIVAC how to get cleaner iron and better castings - The answer would be...

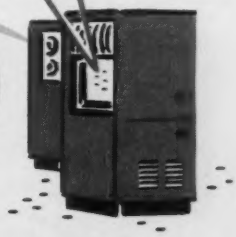
use *Famous* CORNELL CUPOLA FLUX

If you had the world's most advanced computer and wanted to get the answer to securing better castings at low cost, you'd feed the following characteristics into the machine: cleaner iron, less sulphur, easy and economical to use. After all the lights blinked and all the gears whirred and all the tubes reacted, you'd get the same answer any experienced foundryman can give you: Use Famous Cornell Cupola Flux.

Here's why! Famous Cornell Flux is a scientifically blended mixture of fluorspar and other selected ingredients which react chemically in molten metal, purifying it and giving carbon constant. This is the fluidizing action foundrymen want and get when they ask for Famous Cornell Cupola Flux. If you don't have a UNIVAC handy, take our word for it: try Famous Cornell Cupola Flux, or write for Bulletin 46-B.

"often imitated but never equalled"

UNIVAC JR. *says: Have you tried* Famous **CORNELL** Aluminum or Brass Flux? They're the right answer to proper Aluminum and Brass melting... Write for Bulletin 46A



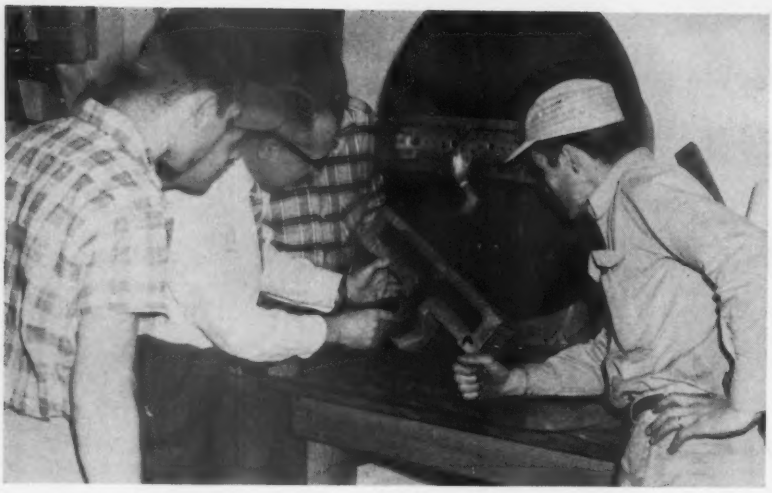
The **CLEVELAND FLUX** *Company*

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered



Apprentices learn how core drier design can affect casting quality

PATTERN ENGINEERING

...Needs Trained Men

By RAY OLSON
Vice President
Southern Precision Pattern Works Inc.
Birmingham

OFTEN we have all heard and read the legends describing the "old-time" patternmaker. The same is true of molders, machinists, draftsmen, printers, carpenters, and what have you. We are told of their feats and exploits and of the shameful inadequacies of the present-day mechanics.

The old timer was supposed to have started with an idea, a piece of wood, and a chisel. He then promptly proceeded to shape up the wondrous things that started us along on this mechanical age. As always is the case, we never hear about the also-rans, only an exaggerated story about the best of the era.

We would like to strike a blow for the men of today. There are still plenty of men around who can work with the self-same idea, block of wood, and chisel; but who cares. Now we have to know the basic requirements, at least, of dozens of foundry processes which were not in existence yesterday. Pattern materials, methods of processing, and end uses are so widely diversified that a new identity—the pattern engineer—has joined our parade.

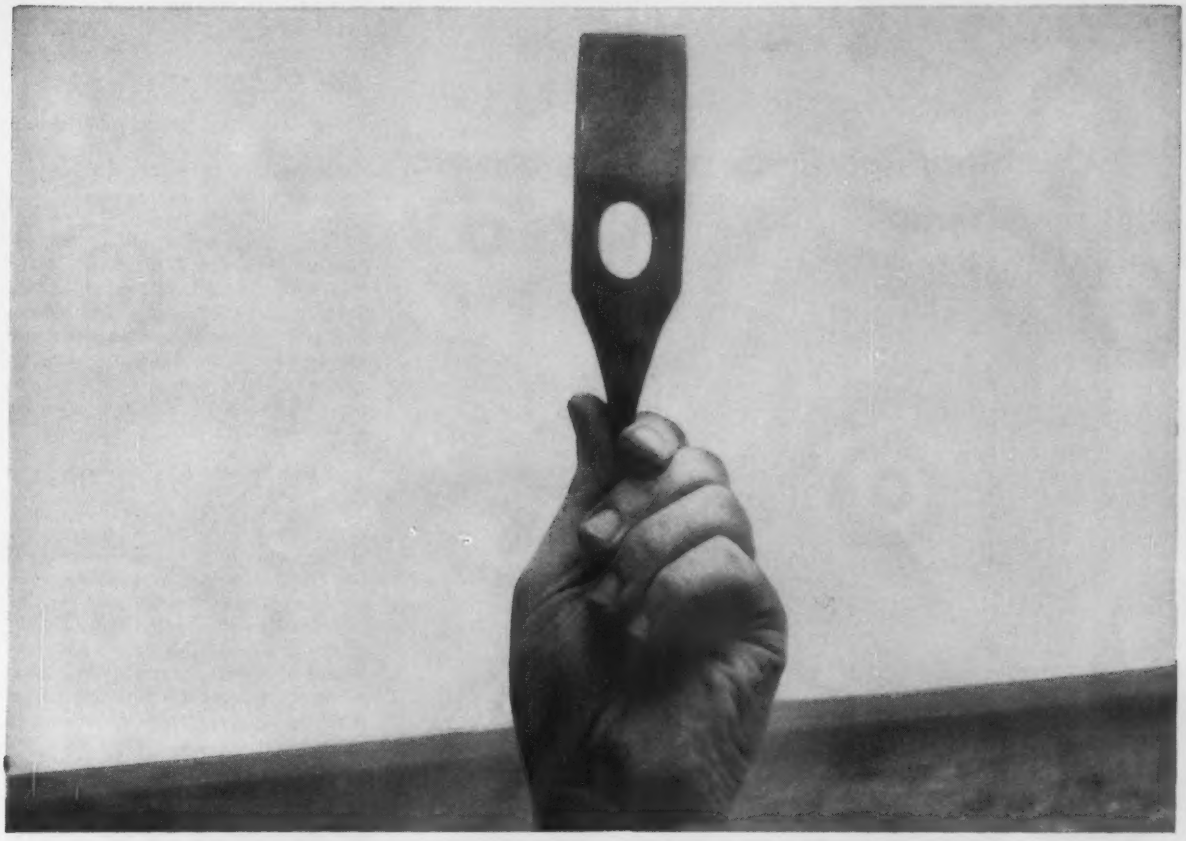
Specialization and diversification are bywords, necessarily applied to today's mechanical trades. This specialization makes it necessary to have an interpreter who should be familiar all the way from the engineering department through to the finished product. He can best interpret the necessary requirements so that the patternmaker can produce the best tools for the job. We think that an interpreter is an apt description of a pattern engineer.

When engineers or designers are starting to lay out a casting, a pattern engineer can really be helpful. Location of casting walls, size of fillets, shape of pads and ribs can in many cases be modified to an advantage. These modifications can materially reduce the cost of pattern equipment. Of more importance, the cost of producing castings and casting quality are definitely improved if foundry problems are taken into consideration. Many of these compromises can be worked into the design of a casting without detracting from casting appearance or interfering with machining or assembly.

Close co-operation between tool engineers or machine shop supervision and pattern engineers can save a lot of grief and money. Such things as chucking surfaces, locating points, and parting lines can be clearly established. The method by which a casting is made will have a marked

Engineering concerning finishes, partings, and core assemblies is done before the pattern work begins

Drawing board helps future pattern engineers to plan conversion of a green sand casting to shell molding



B&C jobs are tough, their core oil tougher!

Located in Chicago's south side, B&C Foundry is a small jobbing foundry which serves the diverse industries located in its area.

Its castings range from contact wheels for metal polishing to beryllium copper hammer heads . . . tough jobs in which cores are likely to blow unless made with precisely the right kind of core oil.

"Fortunately, we found that 'right' core oil in Cities Service Delco #936," says President Alex Cosmos. "Not only has Delco #936 ended the blows that other oils gave us, it also enables faster mulling, makes stronger cores, and yet shakes out easily. It's everything a core oil should be."

Whether your foundry is large or small, your work specialized or diversified, you'll find Cities Service Core Oil is "everything a core oil should be." For precise recommendations, talk with a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

Tough Grind? "Well, no foundry operation is a breeze—but the unusual quality of Cities Service Delco Core Oil makes ours a lot easier," says President Alex Cosmos.

Where Core Is Crucial. "We had trouble with blows before using Cities Service Delco Core Oil," says Mr. Cosmos. "It stopped blows, enabled stronger cores."

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Circle 633 on Page 51

new shock-absorber

chipping hammers by Ingersoll-Rand

Ingersoll-Rand has done it again—introduced a "shock-absorber" chipping hammer. Here are a few of the advantages this new concept in hammer design gives you:

- Provides new operator comfort and efficiency
- Cushions the chisel in the cut
- Absorbs chisel vibration
- Substantially reduces noise
- Eliminates maintenance due to improper operation

These new Shock-Absorber Chipping Hammers are made in 5 sizes—each with four easily converted power ranges. This means you have 20 power combinations to meet exactly the cutting need of any type of job.

Call your nearby Ingersoll-Rand AIRengineer. He will be glad to show you this revolutionary new tool, and let you test it in your own shop, on your own work. Both you and your men will prefer it. Ingersoll-Rand, 11 Broadway, New York 4, N.Y.

8-750

Ingersoll-Rand

Tools plus AIRengineering increase output per man

bearing on the amount of finish which must be allowed and thus the type of machine or machine tool best suited for the operations.

Pattern engineers should be familiar with every piece of molding and core making equipment in the foundry. Special requirements for rigging patterns on new type foundry machines make this necessary.

There has been a great deal of hue and cry about the shortage of engineers graduating from all of our colleges and universities. This shortage will no doubt exist for many years due to the fantastic requirements of the automation age, of nuclear development, and new concepts of transportation, etc.

Raw Material Is Available

For some purposes at least, let's make more practical engineers out of the material at hand. Available is the finest raw material—young men in industry and boys who are unable to spend four years in college. Many companies, large and small, have excellent apprentice training programs. When their programs are functioning properly, a boy spends some time in each phase of patternmaking. The boys should be encouraged to do some supplementary study such as evening courses in mathematics, engineering, chemistry and the like. This extra-curricular work should start early in their apprentice training program.

A few of those who show the best aptitudes and interest could then be side tracked for part of their later apprenticeship. Some time could be spent in the product engineering department, tool design, and tool room. It might also be logical to work a while in the production machine shop and on the assembly line. Last, but definitely not least, all patternmaking apprentices should spend some time in the foundry to see how the job is being done.

It may seem at first glance that a boy will not have progressed far enough in patternmaking at the end of his normal apprenticeship when he has diversified as above for perhaps a year. In some cases this lag is offset by an agreement with the individual whereby extra time is served. Even without such an agreement we feel that both the employer and the trainee will benefit in a very short time.

There is no doubt that we are entering into a new era for the foundry industry. The ever-increasing pressure to make things better looking, lighter in weight, stronger, smaller, and more complex is bringing back parts which we had been losing to other methods of fabrica-

Circle 634 on Page 51

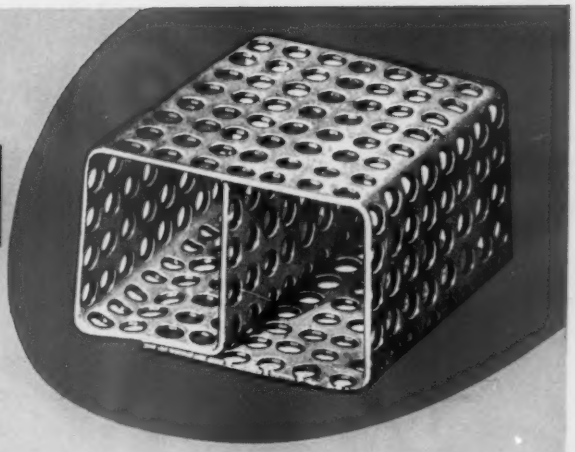
for light core castings

fine FANNER perforated chaplets

Provide

6 BIG

advantages



COMPLETE FUSION—Large number of perforations in light metal insure perfect fusion in light casting

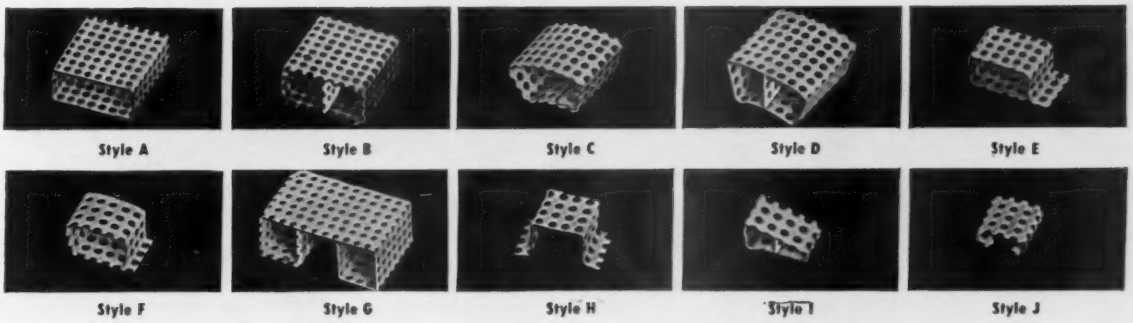
WILL NOT CHILL — Because of the large perforated area, there is no concentration of metal at any point to chill and cause leaks

PERFECT VENT — There are no gas or air pockets to cause "blow holes", so that perfect ventilation is assured

LARGE SUPPORT AREA — Widely distributed support area holds core more securely in place

FLEXIBLE SHAPE — Made in 10 styles in any shape or contour required, flat or curved to any radius, wedge-shaped, bridged or with extended ends

ACCURATELY MADE — Produced to exacting standards on specially designed machines to meet specifications



Style A | Style B | Style C | Style D | Style E

Style F | Style G | Style H | Style I | Style J

For light core work you can depend on Fine Fanner Perforated Chaplets to give you perfect core support and complete fusion. These versatile chaplets have the precise features for your particular job . . . the right shape, the right size, the right construction and the right material. They are made of tin coated sheet steel, aluminum, copper or brass Fine Fanner Perforated Chaplets are available in a large number of types, some of which are illustrated and in a wide range of thicknesses and sizes.

If you don't know all about the many advantages of Fine Fanner Perforated Chaplets . . . write for the Fanner Chaplet Catalog today!

Engineering Service . . .

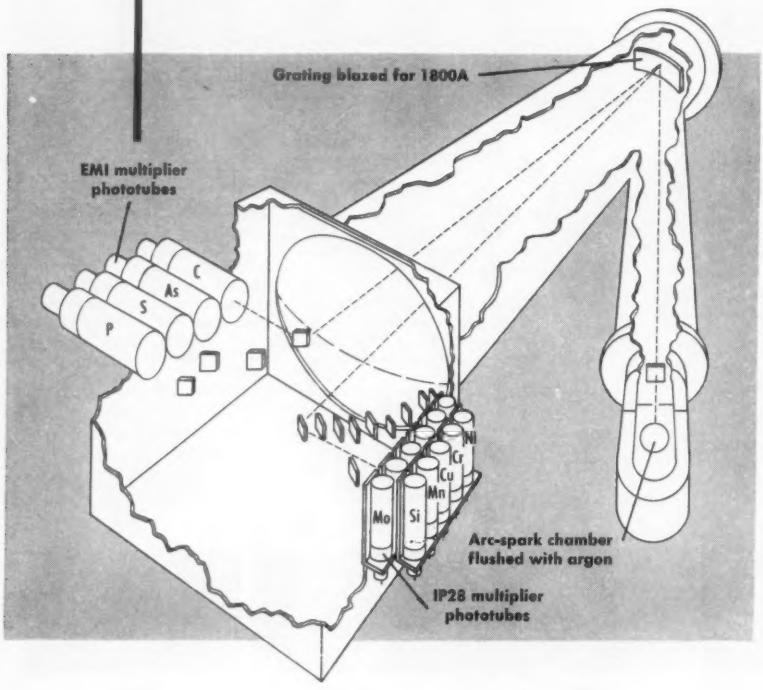
Qualified and specialized engineers in FANNER'S Technical Service Division are available for consultation, without obligation, or problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that FANNER has invested in this field to improve your profit picture. Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

BROOKSIDE PARK CLEVELAND 9, OHIO

Designers and Manufacturers of Fine Fanner Chaplets and Chills

New Quantovac adds C, S, & P to metallic elements for complete high-speed analysis of steel & cast irons



ARL introduces the first large vacuum spectrometer to extend range of direct-reading spectrochemical analysis into far ultraviolet

The iron and steel industry has an important new high-speed analytical tool. For the first time, carbon, sulfur and phosphorus can be analyzed simultaneously with all the metallic elements in a few minutes. These nonmetallic elements no longer require expensive, separate analysis. Now, this one high-speed, direct-reading instrument will do the complete job.

By means of an evacuated spectrometer and argon-flushed arc-spark chamber, the Quantovac extends the spectrum range into the far ultraviolet. It thus provides the most sensitive arc lines of C, S, P, As, and Se for spectrochemical analyses, besides the usual lines of the metallic elements. In fact, as many as 24 elements may be analyzed simultaneously in the 1600-3300A range with the Quantovac.

The Quantovac will provide high-speed furnace control. It will save time and labor. Please write for full information. Your inquiry will be answered fully and promptly.

*TRADE MARK

Applied Research Laboratories
SPECTROCHEMICAL EQUIPMENT
3717 PARK PLACE • GLENDALE 8, CALIFORNIA
NEW YORK • PITTSBURGH • DETROIT • CHICAGO • DALLAS • LOS ANGELES • LAUSANNE, Switzerland • LONDON, England

tion. Metallurgical developments and new foundry techniques have made it possible to double or even triple the strength of a casting.

Most of the new foundry processes were developed to make castings faster and to closer tolerances than was possible before. These processes have resulted in a varying degree of automation in the foundry, and a casting which will be more valuable to the customer. By more valuable, we mean that it will cost him less to finish and assemble. As the requirements for closer tolerances and higher production increase in the foundry, the demands on pattern engineering multiply. We in the pattern game have not kept pace with the times.

A number of companies are having foundry patterns made by tool and die shops. This is not surprising when one sees the complex rigging required for some patterns and coreboxes. Tolerances of one-thousandth of an inch are common, and hardened and ground steel parts are being used. We have heard, however, that these tool and die shops need at least one good patternmaker to steer them on the right path.

Pattern Shops Must Be Modern

Let's bring this work back where it belongs—to our pattern shops. We will need trained men to handle the pattern engineering, and the best way to get them is to make them in such a manner as mentioned earlier. We will need more and better metalworking machinery, and it's about time we did something about it. No truer words have been spoken than the old slogan, "You can't do today's work with yesterday's tools and expect to be in business tomorrow." This definitely will also apply to the skills of our mechanics.

During this period and the periods to come, there will be a shortage of engineers, both graduate and practical. Let's do our part to alleviate the shortage by developing more pattern and foundry engineers. In our shop, a jobbing pattern and aluminum foundry operation, we are keenly aware of this need. We have added and will continue to add more facilities to produce the kind of tools or patterns required by foundry operations of today and tomorrow. We have an active apprentice training program and concentrate on pattern engineering. We hope that in our small way we can, together with others like us around the country, help the foundry industry retain the place in our national economy it so richly deserves.

Editor's note: This paper was presented before the Niagara Frontier Regional Foundry Conference held in Buffalo, Oct. 24-25.

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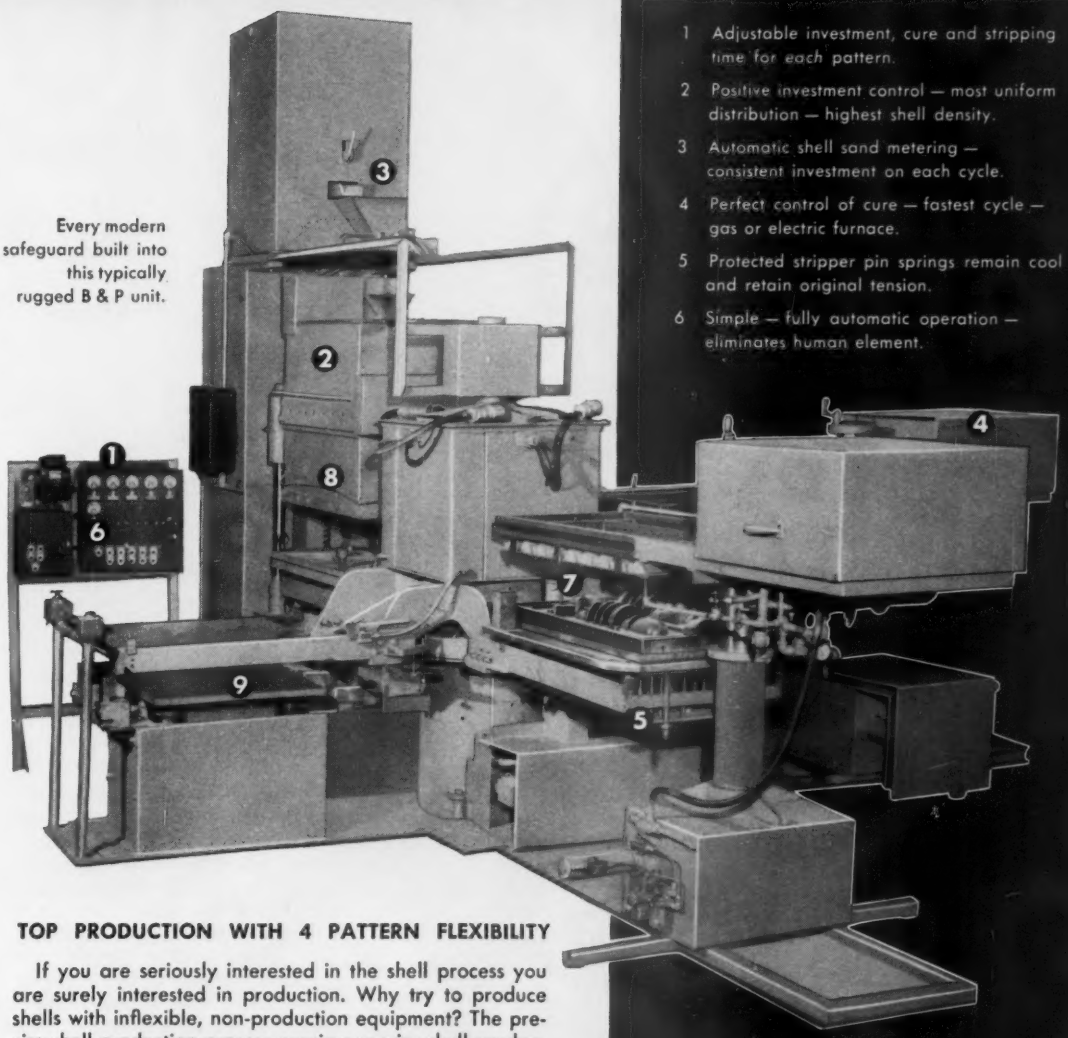

1 Adjustable investment, cure and stripping time for each pattern.

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If you are seriously interested in the shell process you are surely interested in production. Why try to produce shells with inflexible, non-production equipment? The precise shell production process requires precise shell production machinery and only the B & P Formatic can really meet that requirement . . . and provide quick-change, four-pattern flexibility with individual pattern control.

In these modern Formatic units, every operation is precise and automatic . . . every step in production is handled by production machinery. You can't afford not to investigate a one-pattern, two-pattern, three-pattern or four-pattern Formatic . . . part of the complete B & P line for shell molding, blowing and sand processing.

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THE WORLD'S FOREMOST DEVELOPER OF FOUNDRY MACHINERY

Circle 625 on Page 51

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"Science is not a secret order which can be joined only through a set, ritualistic initiation complete with gown, cap, and hood"

Scientists Anonymous

IN the face of all of the sputnik hullabaloo raised lately over our lack of science and scientists, wouldn't it be funny if we discovered that almost as many bottlenecks to earthshaking developments had been broken by people with seventh and tenth grade educations as by super-universitied highbrows with strings of letters trailing behind their names.

And should this turn out to be true, I'm afraid it would be far from funny if all of the academically unwashed, undocterated boys and girls earning their keep at desks and drafting boards and in labs, shops, and foundries became completely frustrated on realizing the humiliatingly low spot they hold on the scientific totem pole. What a mess we really would be in if they threw up the sponge and left all of the thinking to the fully ordained academic elite!

Where Credit Is Due—For most of my life, my work has brought me into close and personal contact with folks responsible for rather important scientific accomplishments. As a result, I know that the most successful of these, while duly appreciative of the tremendous value of formal education, would be first to admit their indebtedness to the relatively unschooled Toms, Dicks, and Harrys who in the course of their daily work contributed many missing jigsaw pieces indispensable to the puzzle as a whole.

As I discussed this subject with a longtime personal friend of mine, Dr. T. A. Boyd, one of the developers of Ethyl gas, he said he thought I had a point that might be made, provided that I didn't go overboard. "In fact," he went on, "the late Dr. R. A. Millikan, Nobel Prize winner and president of Cal Tech, said something along these lines in his autobiography. Do you have it?" I didn't; so he gave me the following quote:

"Historically, the thesis can be maintained that more fundamental advances have been made as a by-product of instrumented engineering improvements than in the direct and conscious search for new laws."

According to my 15-lb dictionary, science is "knowledge of principles and facts." If we take this oversimplified definition literally, a pastry cook who has developed a foolproof recipe for baking pies which are simply out of this world is just as much a scientist as Dr. Millikan, who first measured the electrical energy in the electron. Maybe she couldn't name the particles of the atoms in the molecules of the materials she selected and used, but she did know enough of the principles and facts behind her process to go on making one mouth-watering delight after another.

Certainly the gangs in our foundries who, day after day, turn out tons of castings, with negligible scrap (fairly negligible, that is), for everything under the sun from weights for cuckoo clocks to the frames and parts for particle accelerators and rocket launchers must know enough about the facts and principles of what they're doing also to qualify as scientists, give or take a degree.

A scientist! Who, me?

No Rabbits from Hats—What I'm afraid of is that one of these days there's going to be one of the dog-gonedest awakenings when the rank and file discovers that no matter how many letters one of our new crop of scientists has behind his name, he can't pull rabbits out of hats. In fact, he'll not even be able to own a hat without the help of all these unsung and untitled lesser scientists who turn out luscious pies and other useful things and services.

I think it's important that we clear the decks for much greater accomplishment by realizing that science is not a secret order which can be joined only through a set, ritualistic initiation complete with gown, cap, and hood. To the contrary, it's a wide-open field, already well populated, with lots of room for curious folks looking for and finding answers to questions arising from their work, then proving, applying, and sharing their answers. Everyone is welcome to this field, with or without graduation certificates.

One little closing thought—and I'm almost afraid to mention it: If there should be in our noble craft (and I hope not) any of those glory-grabbing, eager-beaver plagiarists who cabbage onto the tips, hunches, and out-and-out recipes supplied by our lesser Tom, Dick and Harry scientists, not only without giving them credit, but claiming them as their own—well, the comment is unprintable.

In spite of splendid suggestion sys-

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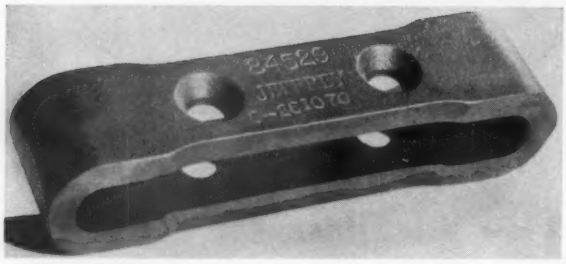
Circle 638 on Page 51



Cast chain link replaced weldment. It cuts costs 61 per cent and increases chain life

Cast Chain Link
Wins Redesign Contest

THE winning entry in the 1957 redesign contest of the Gray Iron Founders' Society shows clearly what a fertile field conversions offer casting producers, even in the area of plain component parts. A chain link converted from a steel weldment to a ductile iron casting was the first prize winner. Worth $500 to Harold R. Warsmith, Jeffrey Mfg. Co., Columbus, Ohio, who submitted it, the link embodies many of the advantages typical of those castings enjoy over other forms of fabrication. It now is in production in eight sizes of chain.

This entry was of particular interest because of the need for high tensile strength. The cast link provides an ultimate load strength of 49,000 lb, as opposed to 33,675 in the weldment —an increase of nearly 50 per cent.

In addition, the casting eliminates a total of 20 finishing operations required by the weldment. These include individual shearing, rolling, welding, drilling, countersinking, scarfing, and burring operations.

The pattern for the cast chain link provides cored holes, including countersinks, and casts company name and catalog, pattern, and chain numbers on the reverse side.

Total cost reduction is a whopping 61 per cent, and at the same time, the casting increases corrosion resistance and wear life of the chain.

Equally important to Jeffrey was another dividend made possible by the casting process. Continued production of the weldment would have required a $42,000 special equipment replacement, for a forming machine and dies. Jeffrey decided that there "ought to be a better way." The casting process was the answer. It averted the outlay of the $42,000 and also made possible a greatly improved, less costly product.

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tems with monetary awards, we have a long way to go before the valves are opened wide to a full flow of creative and constructive help from the thinking of our people. Guaranteed acknowledgment of the source of the contributions is a step in that direction.

Material Handling Institute Elects at Annual Meeting

R. L. Fairbank, vice president, Towmotor Corp., Cleveland, was elected president of the Material Handling Institute Inc. at its annual meeting in New York on Dec. 10. Other officers include Eugene Caldwell, general manager, Baker Industrial Truck Div., Otis Elevator Co., Cleveland, first vice president, and C. L. Fell, vice president, marketing, American MonoRail Co., Cleveland, second vice president. George G. Raymond, president, Raymond Corp., Greene, N. Y., was elected a director after two terms as president of the institute.

Institute members also elected new chairmen of four of the fourteen product sections of the group. They include the following: Powerized Hand Lift Truck Product Section, L. A. DePolis, Clark Equipment Co.; Electric Truck Product Section, Roy

R. L. FAIRBANK

L. Wolter, Automatic Transportation Co.; Floor Truck & Industrial Trailer Product Section, A. M. Barrett, Barrett-Cravens Co.; Monorail Product Section, A. F. Anjesky, Cleveland Tramrail Div., Cleveland Crane & Engineering Co.

The new officers and product section chairmen also will serve on the Cleveland Tramrail Div., Cleveland Crane & Engineering Co.

New Gray Iron Foundry Opens

Cornwall Foundry Co., Meridian, Miss., has begun production of gray iron castings. Wesley Mello is president, and Fred Dryden is works manager.

Philadelphia Clinic on Sale Of Castings Is Rescheduled

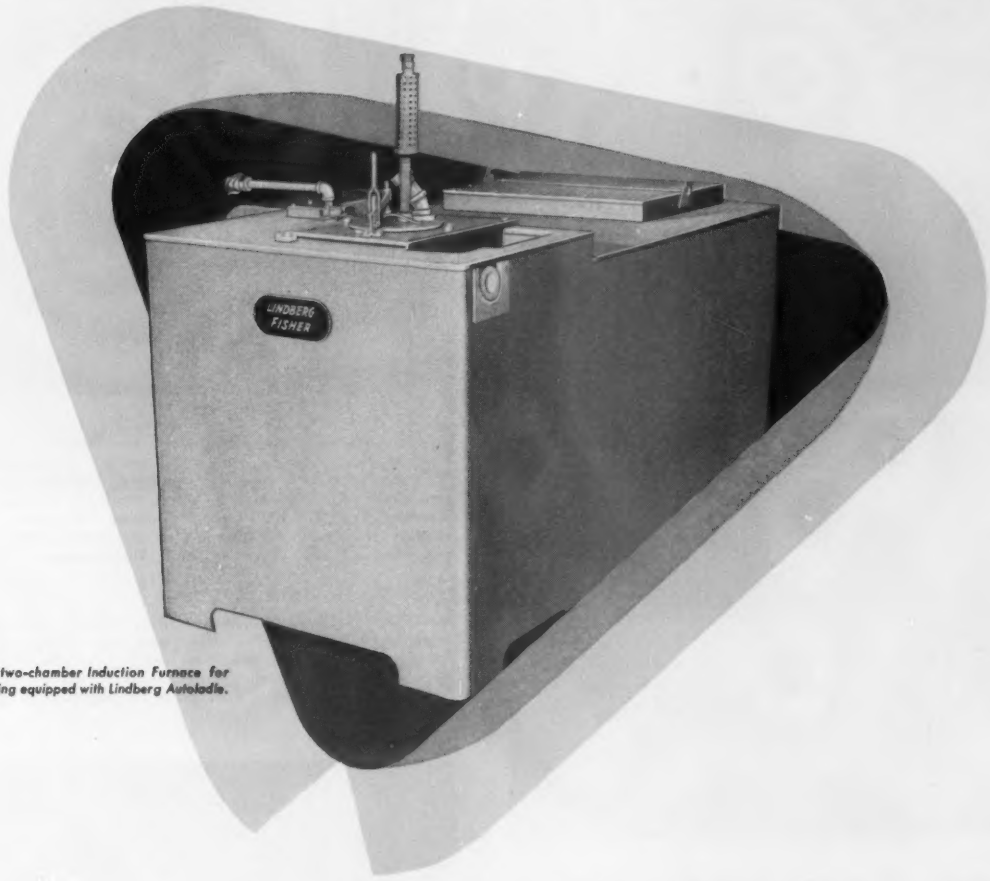
To avoid a conflict in meetings, Metallurgical Associates Inc.. New York foundry consulting firm, has rescheduled the date of its first one-day sales training clinic for casting salesmen. The new date is Feb. 11, at the Sheraton Hotel, Philadelphia. Originally set for Jan. 21, at the same location, the clinic is the first of a series to be held across the nation during 1958.

The second and third in the series will be conducted in Cleveland, at the Hotel Carter, Feb. 25 and Mar. 25. These clinics, open to all foundries, are based on the theme "Techniques of Selling More Castings . . . Profitably!"

Classes are limited in size and will be instructed by successful salesmen. Subject matter will include pertinent technical information prepared under the supervision of Prof. Howard F. Taylor, head, foundry department, Massachusetts Institute of Technology. Harold Brown, vice president, Metallurgical Associates, is directing the series.

The $55 registration fee includes working materials and luncheon. Headquarters of Metallurgical Associates are at 30 Rockefeller Plaza, New York 20, N. Y.

Here's the ideal combination for casting aluminum automatically



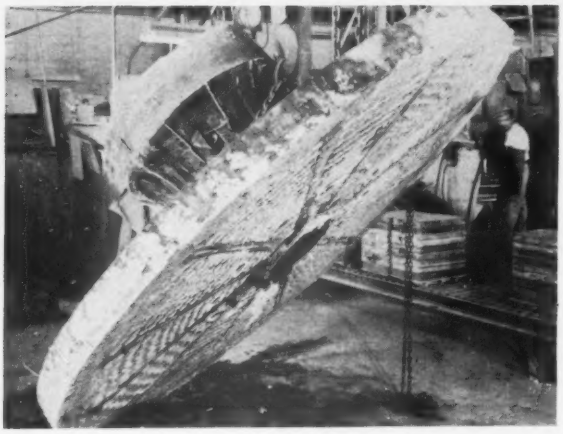
Lindberg-Fisher two-chamber Induction Furnace for melting and holding equipped with Lindberg Autoladle.

Do you die-cast aluminum? Then take Lindberg's famous two-chamber induction melting and holding furnace, add "Little Joe" Lindberg's new automatic pump, and you'll have the most efficient automatic combination anywhere. The Lindberg-Fisher two-chamber furnace *melts* in one chamber, *holds* metal at precisely the right temperature in the other chamber, and "Little Joe" automatically delivers exactly the right size shot to the casting machine. With this combination all handling of molten metal is eliminated, perfect control of metal temperatures and shot size is maintained, and all automatically. For safer, more economical, more precise handling of aluminum or any non-ferrous metals or alloys better see Lindberg. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.

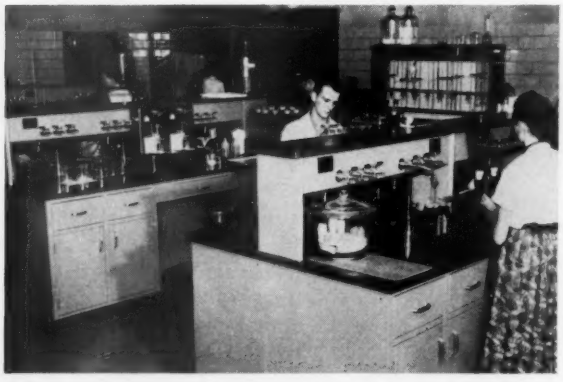
LINDBERG heat for industry

News Views

ELECTS OFFICERS: New officers of the Electric Overhead Crane Institute Inc. were elected at the group's annual meeting. Left to right, Arland R. Walkley, Manning, Maxwell & Moore Inc., vice president; William W. Peattie, Northern Engineering Works, director; Roy P. Williamson, Northern, alternate director for William H. Morgan, Northern; Joe H. Peritz, executive secretary and treasurer, and Frank M. Blum, Harnischfeger Corp., president

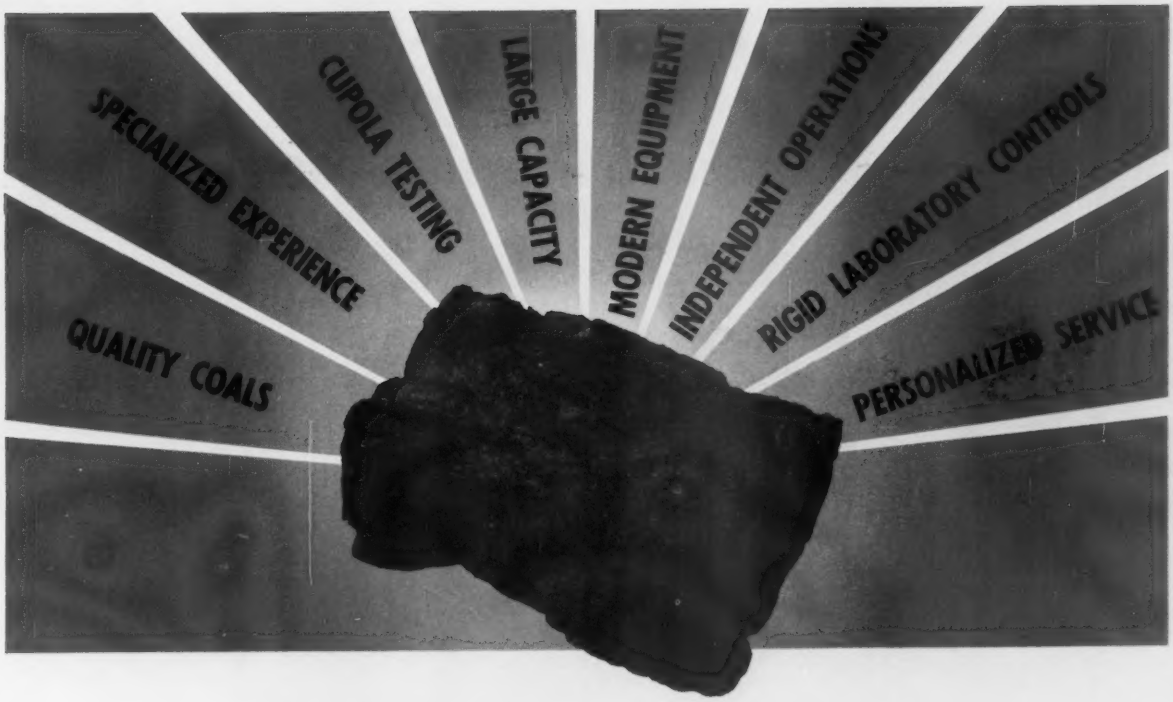


KINGSIZED ALUMINUM CASTING: This 4000-lb, 8½-ft-diam turntable for airplane testing work was cast by Modern Pattern & Foundry Co., Los Angeles, from Tenzaloy, a self-aging alloy produced by Federated Metals Div., American Smelting & Refining Co. Largest Tenzaloy casting ever made, it required no heat treating



METALLURGICAL LABS: Two new metallurgical laboratories now are in operation for Gardner-Denver Co., one at Quincy, Ill., and the other at the Keller Tool Div., Grand Haven, Mich. The Quincy lab, part of which is shown here, will check incoming bar stock and analyze castings produced in Gardner-Denver foundries

FEF ADVISORY COMMITTEE: The Foundry Educational Foundation advisory committee of University of Kentucky met recently and discussed the FEF program at the school. Left to right are Frank G. Dickey, president, University of Kentucky; C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., FEF president; Thomas Barlow, Eastern Clay Products Dept., chairman of the meeting; and Robert E. Shaver, dean of engineering at University of Kentucky.



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ABC's long-time record for maintaining the consistent, uniform quality of its foundry coke results from many factors — combined to an exceptional degree in ABC operations. These include:

QUALITY COALS — a scientific blend of the highest quality specially prepared Alabama coking coals and premium quality, low volatile Pocahontas coal from West Virginia.

SPECIALIZED EXPERIENCE covering 37 years of producing only quality foundry coke.

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CUPOLA TESTING for carbon pick-up and melting temperature accurately determine coke quality and performance.

INDEPENDENT OPERATIONS, with no blast furnace or other connections, assure our customers first call during periods of shortage.

LARGE CAPACITY of 875,000 tons of coke per year from 203 modern Koppers and Becker type ovens.

MODERN EQUIPMENT in every phase of operations.

PERSONALIZED SERVICE that follows through on every order to maintain dependable deliveries at all times.

ABC Foundry Coke is produced in two distinct types — Standard and Malleable.

Your inquiries are invited.

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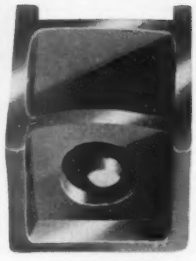

Mag-thorium alloys are being cast to make superior parts for operation at 400-700° F

Casting Magnesium-Thorium Alloys

By THOMAS A. DICKINSON

MAGNESIUM - THORIUM alloys, latest of the aircraft industry's so-called "wonder metals," are now being cast to make parts with superior properties at operating temperatures of 400 to 700° F.

According to officials of the Convair Div., General Dynamics Corp., they aren't quite as castable as some of the older magnesium alloys; but they can be satisfactorily fabricated in sand, shell, semipermanent, or permanent molds.

In addition to having almost as much heat resistance as titanium, mag-thorium castings have the advantage of being stronger than comparable aluminum alloy parts with about 33 per cent more weight. At the same time they have the disadvantage of being slightly radioactive —due to the nuclear characteristics of thorium.

Careful investigations have shown that magnesium alloys containing up to 10 per cent thorium produce gamma rays in such minute quantities that they can be detected only by sensitive meters in direct contact with the materials. Low-level beta radiation can be detected as far as 6 ft away from the same alloys, but this is nonhazardous from the service viewpoint.

Therefore, the radioactivity of mag-thorium materials is principally disadvantageous from the foundryman's viewpoint because it necessitates certain production precautions. For example:

1. Stacks of raw materials should be limited in size to 1000 cu ft and separated by distances of not less than half the height of the stacks in storage areas.

2. Furnaces used in melting the materials should have accessories for the disposal of fumes, since the latter could be hazardous if inhaled for long periods.

3. Workers assigned to the task of grinding or welding castings should

PROPERTIES OF MAG-THORIUM CASTINGS

Tensile strength, 1000 psi	27 to 31
Yield strength, 1000 psi	13 to 16
Elongation in 2%	4 to 6
Brinell hardness	55 to 57
Rockwell E hardness	66 to 68
Density, lb per cu in.	0.066 to 0.065
Specific gravity	1.83 to 1.79

Despite a slight radioactivity, magnesium-thorium castings can be handled with no more danger than aluminum or magnesium

It is EASIER TO INSTALL

It takes LESS SPACE

Its ACTION IS FASTER

It is EASIER TO CONTROL

FOUR GOOD REASONS WHY YOU SHOULD BUY THE BELLOWS AIR MOTOR ...THE AIR CYLINDER WITH THE BUILT-IN ELECTRIC VALVE

When it comes to downright value, it's hard to visualize an air cylinder that can even approach the Bellows Air Motor. For here is a complete packaged air cylinder power unit with all controls built-in: 8-12 volt, electrically-actuated directional valve*, two independent speed controls, and an air transfer system that makes it possible to bring air to the unit through a single flexible hose. No extra valves to buy, no cumbersome piping to install.

1016-B

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Write Dept. FO-258, The Bellows Co., Akron 9, Ohio (in Canada, Bellows Pneumatic Devices of Canada, Ltd., Toronto, 18) for Bulletin BM-25. Or, if you prefer, phone your Bellows Field Engineer—he's listed in the phone book under "The Bellows Co."

The feature of the integral valve brings important advantages. Installation is easier, electrical hook-up is simpler. It fits well in cramped quarters, or on moving machine elements. And of even more importance—the built-in valve means faster action, quicker response, less air consumption, and positive control over piston rod movement.

The Bellows Air Motor is made in five bore sizes: 1¼", 1¾", 2½", 3⅝" and 4½" and in any stroke length. You can have your choice of six different built-in valving arrangements, plus optional hydraulic piston movement stroke control.

*115 Volt for J.I.C. applications, if desired.

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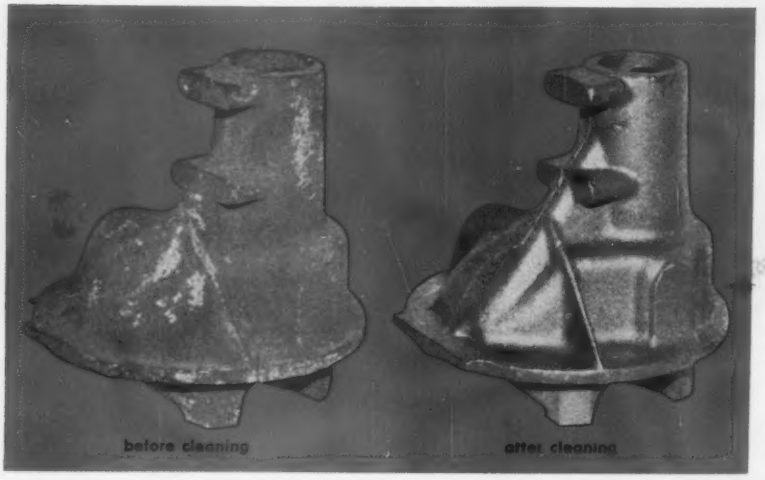
WHEELABRATOR® STEEL SHOT

cuts abrasive costs for

ALL TYPES OF FOUNDRIES



Malleable Foundry Saves $12,000 Annually

Cuts Abrasive Consumption in half

Savings of $1,000.00 a month in abrasive cost are being made at Albion Malleable Iron Co., as a result of switching from a malleable type abrasive to Wheelabrator steel shot.

This high production foundry operates a battery of 8 Wheelabrator Tumblasts, cleaning a wide variety of castings. Consumption of the malleable shot in these machines was at the rate of 20 tons a month. Since changing to Wheelabrator Steel Shot this has been decreased to 110 tons a month, for an annual saving of $12,000.00 on abrasive alone.

More than 1200 firms have standardized on Wheelabrator Steel Shot and are recording inpressive savings. Consistently harder, with greater resistance to breakdown, it lasts longer in use, cleans better, and reduces total cleaning costs.

Write today for Bulletin 89-B — free — for detailed information on Wheelabrator Steel Shot

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be protected against dust or fumes by good ventilation equipment or special masks.

Mag-thorium alloys melt at temperatures above 1200° F and can subsequently be poured with facilities of the types used in processing older magnesium alloys. Results thereafter depend on the molds employed in each instance.

In general, patterns for sand or shell molds are types commonly employed in foundries casting both aluminum and magnesium. However, they generally require a higher allowance for shrinkage—depending of course on the composition of the mag-thorium material to be cast in each instance. Maximum size sections, stud bosses, fillets, and radii are also desirable to minimize stress concentrations.

Can Incorporate Inserts

Inserts like bushings, bearings, and threaded parts can be incorporated in sand or shell molds if necessary. As a rule, cadmium-plated steel inserts are preferable because they lessen the possibility of alloying action. However, nonferrous inserts may be satisfactorily employed if they are chromium plated or coated with a protective ferrous material.

Both shell and dry-sand molds can yield mag-thorium castings of very low porosity. Better finishes and closer as-cast tolerances are obtainable, however, with shell molds.

Production requirements dictate the use of permanent molds in casting mag-thorium, the same as in casting other nonferrous materials, and in all instances relatively simple tooling designs—with minimum section variations, undercuts, and internal coring—are desirable. More complicated castings of course are obtained most economically in semi-permanent molds where higher tooling costs are justified.

Warpage or distortions in mag-thorium castings cannot always be eliminated, due to the relative brittleness of the new alloys at room temperature. Straightening has been done satisfactorily in some instances where castings were preheated to 700° F.

Artificial aging treatments alone can develop the properties of mag-thorium castings for the highest temperature applications, but solution heat treatments are also specified for components requiring the greatest tensile and yield strengths.

Grinding, blasting, and pickling processes used to clean mag-thorium castings are generally those used with all magnesium foundry products.

Circle 642 on Page 51
Circle 643 on Page 51→

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WRIGHT *SPEEDWAYS*

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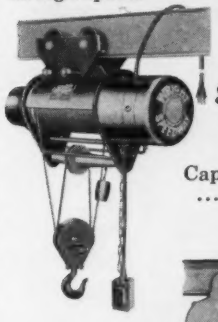
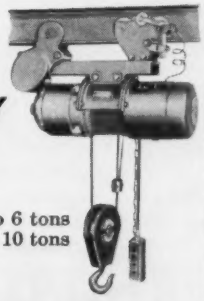
2-SPEED *SPEEDWAY* FRAME 1

Capacity ¼-ton to 1 ton. Two-speed, 1800/450 RPM motors permit precise, gentle positioning of work at slow speed... fast lifting and lowering at high speed.



SPEEDWAY FRAME 1½

4-part reeved. Capacity to 2 tons ...relatively slow lifting speeds.



SPEEDWAY FRAME 2 FRAME 3

Capacities—
Frame 2, ½-ton to 6 tons
Frame 3, 4 tons to 10 tons

NEW WRIGHT ELECTRIC CHAIN HOISTS

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SINGLE CHAIN

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Two capacity ranges as pictured. Single Chain—300 to 2000 lbs. Double Chain—3000 to 4000 lbs.

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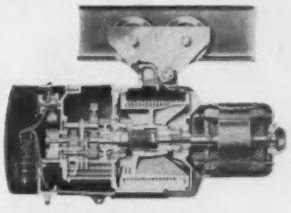
Alloy Steel Load Chain wick-oiled for longest life...heat-treated for long-wearing surface and ductile shock-resistant core—**Load Wheel, Hooks** and **Hook Couplings** drop-forged alloy steel—**Precision Ball Bearings** and **Gears** operate in oil bath—**Double Braking**—**Fewest Moving Parts.**

These Features make WRIGHT *SPEEDWAYS*

Capacities ¼-ton to 10 tons

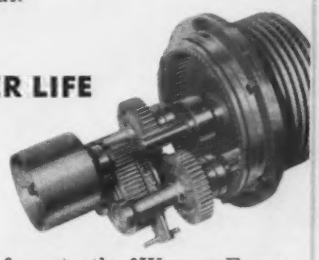
your best buy for—

MORE PRODUCTION



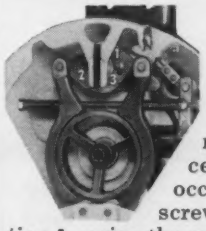
Fine balance and heavy-duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30 minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core is shock resistant to severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



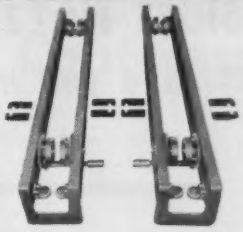
Strength of gear teeth of WRIGHT Frame 2 and Frame 3 *Speedway* Hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flange cross section is bolted to drum at six points and provides extreme resistance to distortion.

EASIER MAINTENANCE



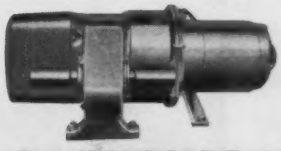
There is "*Nothing to Adjust but the Cam*" to keep the motor brake in perfect adjustment. When excessive load drift occurs...remove the screw shown at Position **1**, swing the cam until Position **2** is in line and replace the screw. Position **3** is provided for the final one-third of brake lining wear. Brake springs and solenoid never need adjustment!

Build Better Cranes Save Money too! with WRIGHT END TRUCKS CRANE DRIVE UNITS *SPEEDWAY* HOISTS



WRIGHT END TRUCKS

For motor-driven cranes and hand traveling cranes—both top-running and under-hung types. Timken Bearings throughout. Wide range of capacities up to 10 tons. Structural steel construction is lighter and stronger than cast frames.



WRIGHT CRANE DRIVE UNIT

For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well-proportioned gear reduction. Units are equipped with WRIGHT-designed solenoid "drag" brake. Size 1 Drive Unit has motors up to 2 HP...Size 2 has motors 3 HP to 7½ HP.

For Complete Information

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DH133B • Frame 1 *Speedways*

E58 • Frame 2 & 3 *Speedways*

Motor Driven Cranes

227 • Underhung, Single Bridge

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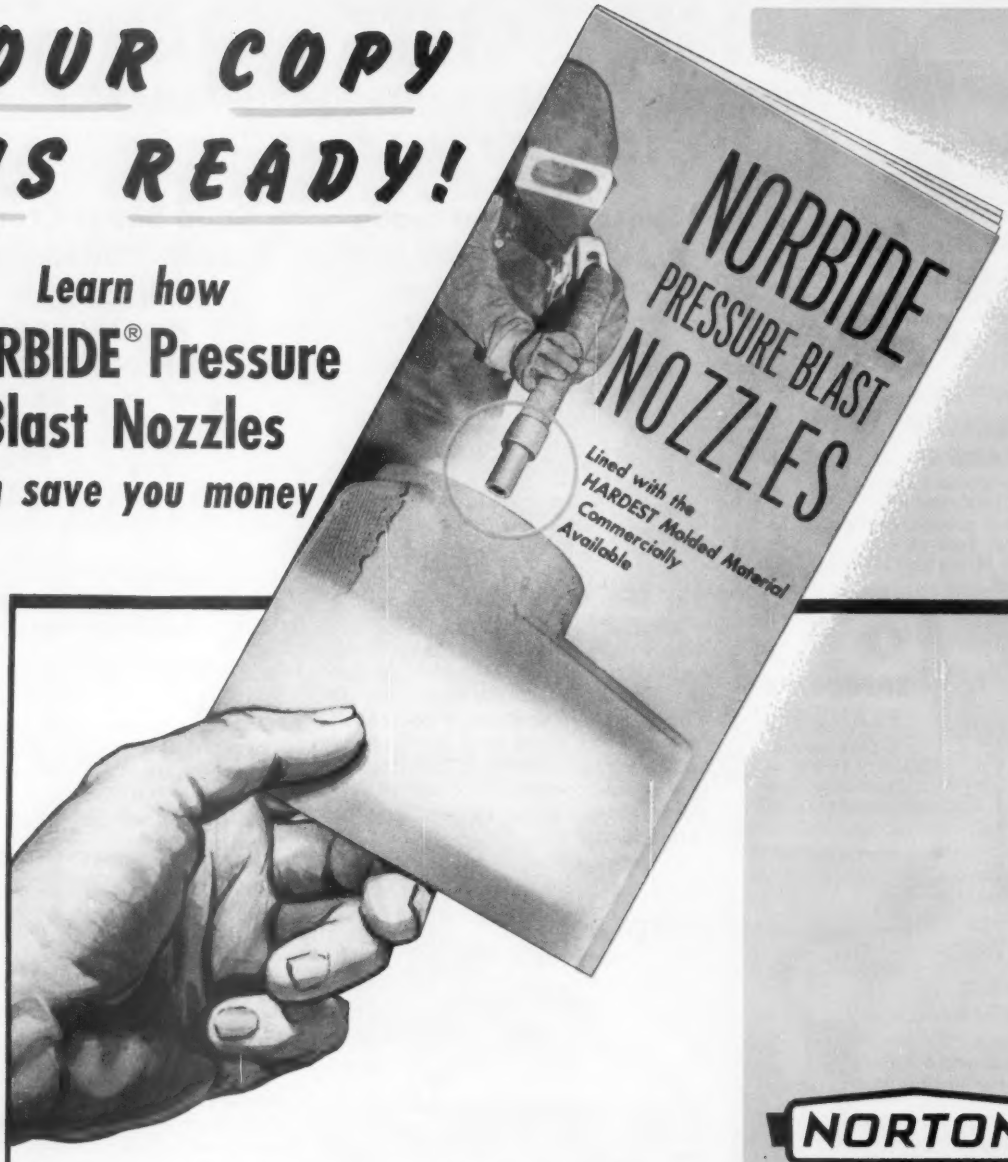

Send for this handy new folder with simplified listings of popular nozzles, up-to-date prices, exploded views of mounting assemblies and other helpful data on famous NORBIDE Nozzles.

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VICTOR E. ZANG
Executive Committee Chairman

Electric Furnace Conference

Has Largest Attendance

By EDWIN BREMER
Metallurgical Editor

FIFTEENTH annual Electric Furnace Steel Conference established the highest attendance record so far attained, namely a registration of 1073 members and guests. Meeting was sponsored by the Electric Furnace Steel Committee of the Iron and Steel Division, Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, and was held at the Penn-Sheraton Hotel, Pittsburgh, Dec. 4-6, 1957.

Plant trip through Babcock & Wilcox Co., Beaver Falls, Pa., occupied the first day of the meeting while three joint technical sessions with separate sessions on ingot practices and castings practices and the annual dinner filled the remaining two days of the conference. At the dinner with Stanley M. Norwood, Electro Metallurgical Co. Division, Union Carbide Corp., New York, presiding, Edward A. Livingstone, Babcock & Wilcox Co., Beaver Falls, spoke on **The Atomic Age Challenge to Steel.** D. L. Clark, retiring chairman of the executive committee was presented a permanent registration card, a certificate of recognition, and a 400-day clock as tokens of esteem for his efforts in promoting the activities of the conference over the past years.

Newly elected chairman of the Electric Furnace Steel Executive Committee is Victor E. Zang, Unitcast Corp., Toledo, Ohio. A. C. Ogan, U. S. Steel Corp., Duquesne, Pa., was elected chairman of the Committee for the Sixteenth Conference to be held in Detroit Dec. 3-5, 1958. P. R. Gouwens, Armour Research Foundation, was elected vice chairman.

Opening joint session was devoted to nitrogen in electric furnace steel. Second joint session was on refractories, and included an extremely interesting paper on **Self-baking Refractory Mix** by L. A. Stoyell, Electro Metallurgical Co., Niagara Falls, N. Y., and T. R. Culbert, Case Institute of Technology, Cleveland. Basic ingredients of the mixture are silicon powder and sodium silicate with the refractory, which may be silicon carbide, chrome ore, silica sand, periclase and magnesite, or zircon sand. Silicon metal powder is 95 per cent minimum Si grade, minus 200 mesh. Silicate is 41° Baume, 1:3.22 ratio, diluted with water to form a solution containing 60 per cent silicate and 40 per cent water by volume. Refractory and silicon powder are mixed together in the dry state in small batches of 100 lb, and then the silicate is added. Amounts of silicon powder and sodium silicate depend upon fineness of the refractory. Reaction between those materials creates sufficient heat to thoroughly dry the mix which has been rammed into place.

The authors reported that the following combinations gave satisfactory self-baking mixes—100 lb silica sand (about 54 AFS grain fineness), 6 lb silicon powder, and 8.85 lb of sodium silicate solution; 100 lb zircon sand (about 109 AFS grain fineness), 4 lb silicon powder and 5.9 lb sodium silicate solution; 100 lb of a mixture of 90 per cent silica sand and 10 per cent silica flour, 6 lb silicon powder, and 8.85 lb sodium silicate solution. The reaction between the silicate and silicon powder generates hydrogen gas which should be ignited with a pilot flame as a precautionary measure.

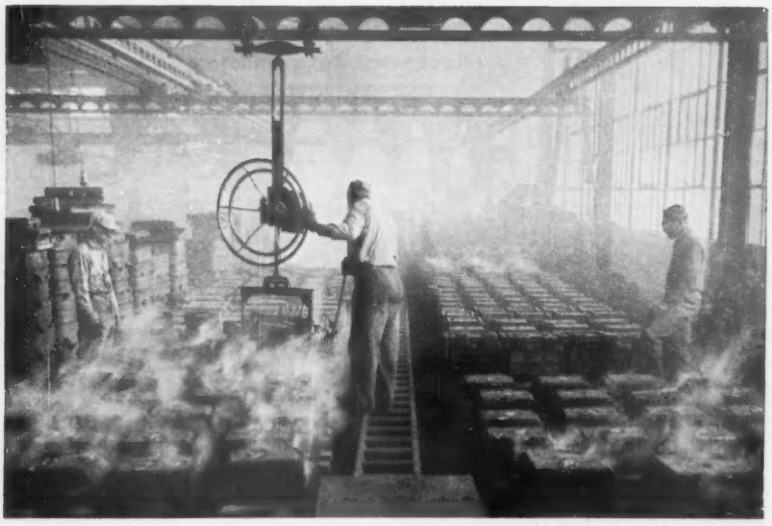
Other papers presented included **Canadian Basic Refractory Practice in Electric Furnaces,** by A. H. Thomson, Canadian Refractories Ltd., Montreal, Que., which briefly described results obtained with Canadian magnesite; **Tar-bonded Basic Refractories,** by J. P. Holt, Basic Inc., Cleveland; **Furnace Bottoms—Installation of Thermocouples in Electric Furnace Hearths,** by T. J. Wayne, U. S. Steel Corp., Chicago, and **Cast and Rammed Sections in Arc Furnace Roofs,** by J. D. McCullough, Babcock & Wilcox Co., New York.

According to Mr. Wayne installation of thermocouples in the hearths of arc furnaces provided a reduction in refractory costs through two approaches. One was the establishment of the most suitable thickness of lining at the beginning of a campaign, and the other was determination of the minimum thickness at which relining is required. Additionally, the thermocouples indicate location of any hot spots which might occur and permit application of remedial measures before they get out of hand.

Application of cast and rammed sections in arc furnace roofs particularly around the electrode openings permits savings in refractory roof costs ranging up to 30 per cent according to Mr. McCullough. Materials discussed included plastic refractories containing 45 to 70 per cent alumina, ramming mixes containing 65 to 83 per cent alumina, and castable refractories volume-stable to 3000 and 3200° F. The first two types are rammed into place while the castables may be rammed or vibrated into place. Latter method is said to reduce considerably the cost of installation.

Technical session on foundry practices was held Friday morning and related to use of oxygen, high impact steels, and spectrographic analyses. In discussing oxygen as an aid in melting G. Tracey, Canadian Steel Foundries, Montreal, Que., pointed out that although he had tried oxygen on only 25 heats, which hardly was a fair test, the use of oxygen for 5 to 6 minutes reduced the heat time 6 to 7 minutes. In the absence of V. E. Belusko and L. E. Fink, Electric Steel Foundry Co., Portland, Ore., their paper was presented by J. W. Tibbits, Canadian Steel Foundries, Montreal. Use of oxygen by the authors permitted employment

Ask Standard how to cut costs with conveyors



Typical pouring floor with molds on parallel lines of roller conveyors.

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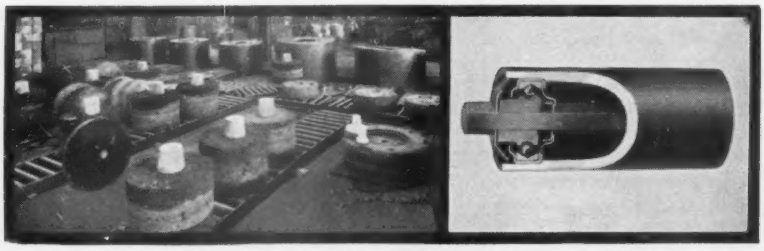

Standard Roller Conveyors feature especially-designed shielded bearings. On the job, shields keep out spillage and sand, give longer, trouble-free roller life.

For details, see the Standard Engineer listed in the phone book or write for Bulletin 309. Address Dept. N-2.

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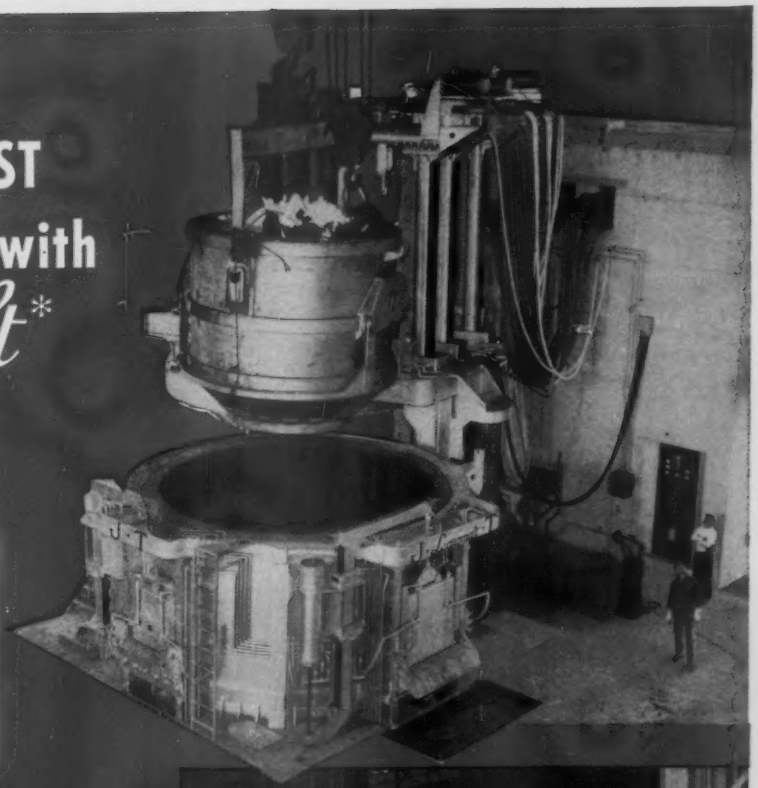
of higher amounts of scrap remelt and higher carbon ferrochromium in production of low-alloy and stainless steels. A carbon drop of 25 points (0.25 per cent) was obtained in 1 to 2 minutes injection of oxygen. Heats varied from 6500 to 14,000 lb, and application of oxygen permitted production of 14 heats in the same time as 12 without use of oxygen. Power consumption was reduced from 760 kw to 601 kw per ton.

Some Aspects of Melting Low-temperature, High-impact Steels, by W. A. Koppi, formerly with Lebanon Steel Foundry, Lebanon, Pa., and now with International Nickel Co. Inc., New York, described the practices followed at Lebanon Steel in producing four grades of ferritic cast steel to meet the requirements of ASTM specification A352-55T for low temperature service. Earl Anger and John Martin, Duralloy Co., Scottsdale, Pa., in **Fluorescent X-ray Spectrographic Analysis** stated that the instrument cannot be used for determining elements with an atomic weight below that of P (31). However, time for determining each major element in high alloy steels is about 3 minutes, including preparation of the sample.

Standardization and Use of the Spectromet in a Steel Foundry, by C. L. Richards, Adirondack Foundries & Steel Inc., Watervliet, N. Y., and Henry Levesque, Baird Atomic Inc., Cambridge, Mass., described advantages and practices employed with the particular instrument while H. W. Calkins and M. F. Hasler, Applied Research Laboratories, Glendale, Calif., in **The Quantovac—a Direct-reading Instrument for the Control of Carbon, Phosphorus, Sulfur and Other Important Elements in Iron and Steel,** presented information on this recent development in which the specimen during sparking is in an inert atmosphere, and the main body of the spectrometer is maintained under a vacuum.

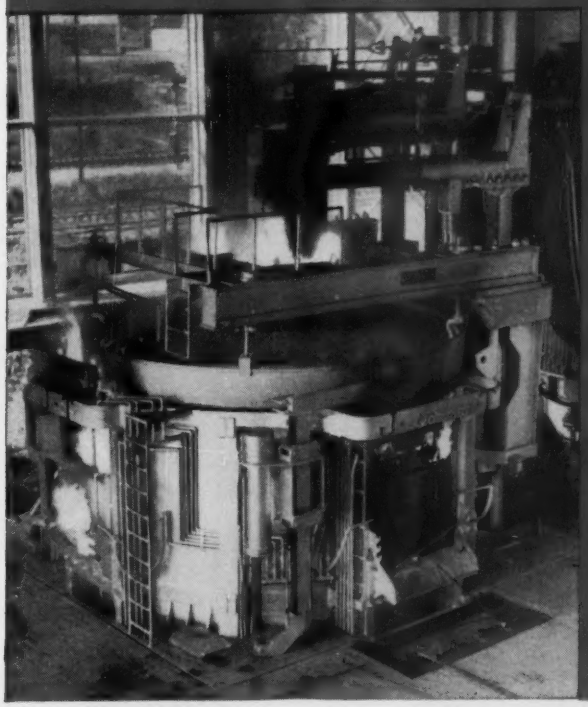
Closing joint session on Friday afternoon considered the economic utilization of power with the following papers: **Power Utilization and Control in the Electric Furnace Steel Plant,** by F. W. Foster, West Penn Power Co., Greensburg, Pa.; **An Effective Demand Limiting System for the Electric Furnace Melt Shop,** by C. A. Scammon, Allegheny Ludlum Steel Corp., Brackenridge, Pa.; **Improvements in Arc Furnace Power Regulation and Electrode Hoisting Systems,** by Frank Nicholson, Swindell-Dressler Corp., Aspinwall, Pa., and **Analysis and Practical Results Obtained from a Study of Arc Furnace Control,** by J. H. Kogen, Askania Regulator Co., Chicago.

WORK GOES FAST and SMOOTHLY with *Lectromelt** FURNACES



Right: Labor-saving top charging lets a Lectromelt Furnace get to work *fast*.

Below: With a Lectromelt Furnace, you can crowd on the power while holding close control on quality.



Lectromelt's hydraulic tilting mechanism provides positive, easily controlled, trouble-free operation.

For Catalog No. 10 giving more details, write Lectromelt Furnace Division, McGraw-Edison Co., 314 32nd St., Pittsburgh 30, Pa.

*REG. T. M. U. S. PAT. OFF.

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Lectromelt

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Boston

Boston— Users of castings have low inventories, substantially below normal in most cases. These small stocks will be a major factor in foundry schedules in the event of increased consumption.

Unfortunately, there are no concrete indications that larger industries will require heavier tonnage of castings through the balance of this quarter. Most gray iron shops are operating three days, and four-day week schedules are the exception.

This also applies to malleable foundries, although one producer, building a moderate inventory of standard fittings, has been pouring somewhat above the average.

Machine tool industry is slow, although inquiries for special machines are slightly better. Textile mill equipment shops, with largest capacity in New England, are estimating on outside tonnage, as are also one or two machine tool foundries. Most of these shops are mechanized and offer sharp competition price-wise.

Price structure for iron castings is weak and margins for most shops are not satisfactory. Pig iron prices for first quarter are unchanged, and cast scrap is lower than one year ago, but foundries are not benefiting accordingly. Steel foundries are operating at somewhat higher rate than iron shops, but on four or four and one-half day schedules are making inroads on backlogs. Heavy electrical equipment demand holds up well.

Nonferrous foundries are producing at slightly lower rate than in fourth quarter, which compared favorably with third quarter. This industry has a backlog estimated at around 200 million pounds, or about a one-month backlog based on tonnage poured through October-December period.

Pittsburgh—Sales of castings have failed to improve after a very dull yearend holiday period. Gray iron operations were particularly slow in January. The only encouraging sales reports concern gradual improvement in automotive demand, although sales to automakers are still well below peak periods of the past.

Foundries supplying steel mills in this area say lower operations at the mills in late December and early January stretched out mills' inventories of such equipment as rolls. As a result, there is little buying on the part of mills, except for a moderate

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NEW STAR in the MILLER
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The revolutionary dc welding performance achieved by the new Miller Gold Star transformer, completely sealed, semimetallic rectifier and weld stabilized circuit is now available in the SRH models. Developed specifically to save room, the SRH is only 30¼" high, offers 200, 300 and 400 ampere machines ideally designed for stacking or paralleling in minimum space.
Complete particulars on the new Miller GOLD STAR SRH will be sent promptly on request.
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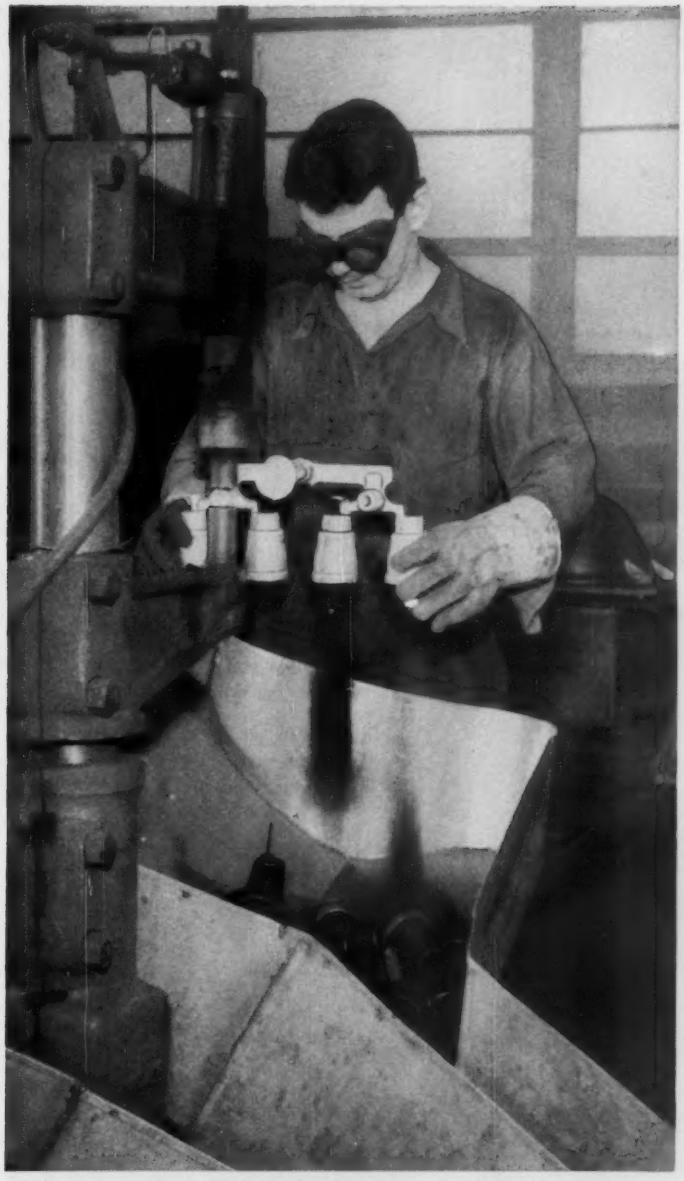

No back-up of castings at shake-out stations now! Excellent collapsibility of cores is one of the many advantages provided by Dexocor.

A soluble dry powder, Dexocor is easy to weigh and mix, assures high green strength, cores withstand necessary handling.

Finished cores made with Dexocor are baked in up to one-third less time, stand up against hot metal during pouring.

"Truly phenomenal collapsibility" OF CORES CREDITED TO DEXOCOR® BINDER

Leading non-ferrous foundry finds this revolutionary new binder brings about many other improvements—from mulling to shake-out.

Plagued by back-up of castings at shake-out stations, this 5 tons-per-day aluminum foundry sought means of improving collapsibility of cores—and found it, in the amazing new *dry binder*, DEXOCOR.

But that was not all they discovered. Reports the superintendent:

"In addition to truly phenomenal collapsibility, DEXOCOR is easy to weigh and mix, provides excellent green strength, and both blown and rammed cores slide readily from boxes. With DEXOCOR, baking time is reduced 30 to 35%, cores stand up perfectly against hot metal—no cracking, no metal penetration, less gas and smoke—and we save 30% on cereal content of core sand mixes."

Used with Mogul or Kordek binder, DEXOCOR dry binder can improve the characteristics and performance of any core sand mix. For more information, and assistance in improving *your* operation, contact our nearest sales office, or write to:

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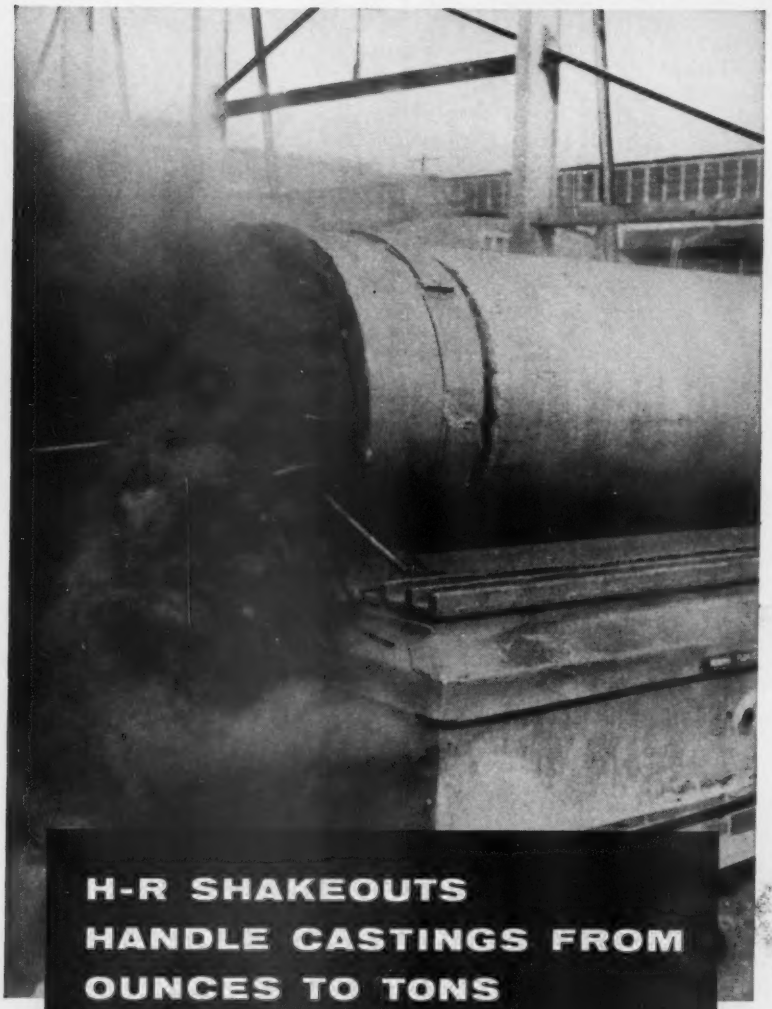
17 Battery Place, New York 4, N.Y.

Corn Products also makes MOGUL® *and* KORDEK® *binders and* GLOBE® *dextrines for the Foundry Industry.*

Circle 648 on Page 51



There is a type of Floatex Shakeout to fit almost any foundry application . . . ferrous or non-ferrous . . . to handle castings from a few ounces to 300 tons. Stroke of each type can be adjusted to improve operation on massive castings, or to protect fragile castings.

These H-R shakeouts also cut time and labor costs. One user saves 12 man-hours per casting . . . another knocks cores out of 400 engine blocks per hour. In addition, where severe noise problems existed, Hewitt-Robins has successfully employed effective methods of noise reduction. To find out how H-R products and services can help you, consult your classified telephone directory for the nearest H-R representative, or contact Hewitt-Robins, Stamford, Connecticut.

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CONVEYOR BELTING AND IDLERS...POWER TRANSMISSION DRIVES
INDUSTRIAL HOSE...VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

amount of replacement of old equipment. Suppliers of equipment say that mills which formerly were not very concerned with prices of small items are now carefully checking prices of all items on an order.

Mill equipment producers continue to enjoy large backlogs, built up in early 1957. They admit that new orders for capital equipment are continuing to decline, resulting in a steady increase in competition for each individual order. Due to still-hefty backlogs, operations in the mill equipment group remain above 1954 lows.

Chicago—A significant part of the slack operations in the castings industry is attributable directly to the slowed down assemblies of 1958 automobiles. Consequently, foundry executives, as well as automotive management, viewed this year's Chicago Auto Show (Jan. 4-12) for some hopeful sign that car sales will turn up soon.

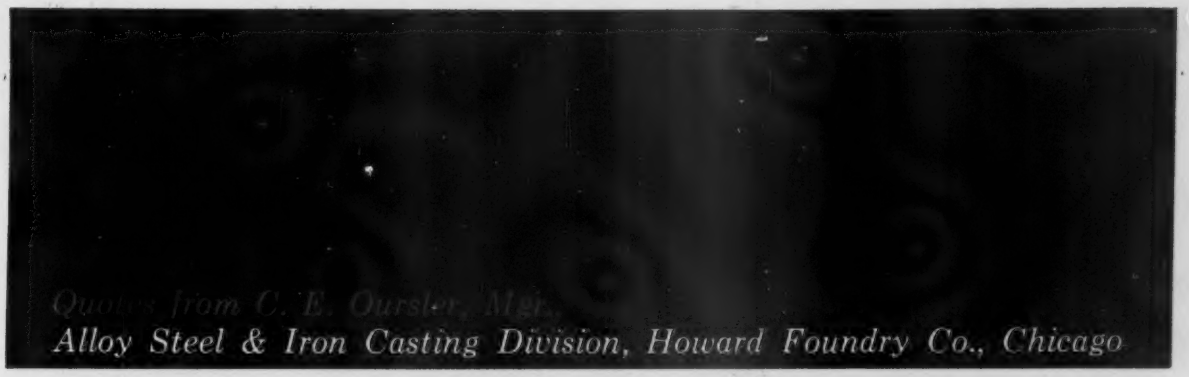
It is too early for full appraisal of the show, the golden anniversary number of the longest and most constant series in the U. S. The $20 million event assumed greater national importance this year with the New York show not being held. With 500,000 square feet, it was the biggest and most elaborate auto exhibit ever assembled under one roof. Attendance approximated half a million people.

Probably few of the visitors were aware of the contributions which the castings industry has made to modern automobile transportation. But foundrymen and those associated with production and use of castings could view the sleek 1958 models with much pride and satisfaction. Since 1901, when the first Chicago auto show was held, the design and manufacture of castings have progressed just as much as the engineering of the cars themselves.

Shown were 20 American makes of cars and 28 foreign cars. It was the first time that imported cars have exceeded American cars in the show. And that, of course, is just as disconcerting to this country's foundry industry as it is to the automobile industry.

Film Provides Information on Grinding Wheel Application

A 16-mm, sound-color motion picture, "Grinding Wheels and Their Application," portrays where and how the modern grinding wheel is used throughout industry. Included is a discussion of the factors that make up a grinding wheel and how



Quotes from C. E. Oursler, Mgr.
Alloy Steel & Iron Casting Division, Howard Foundry Co., Chicago

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"G-E resins have higher tensile strength than many others we have tried, so we use less resin per mold."

GOOD HOT STRENGTH MEANS FEWER CASTING LOSSES

"G-E resins have excellent hot strength, and casting losses from thermal shock are rare."

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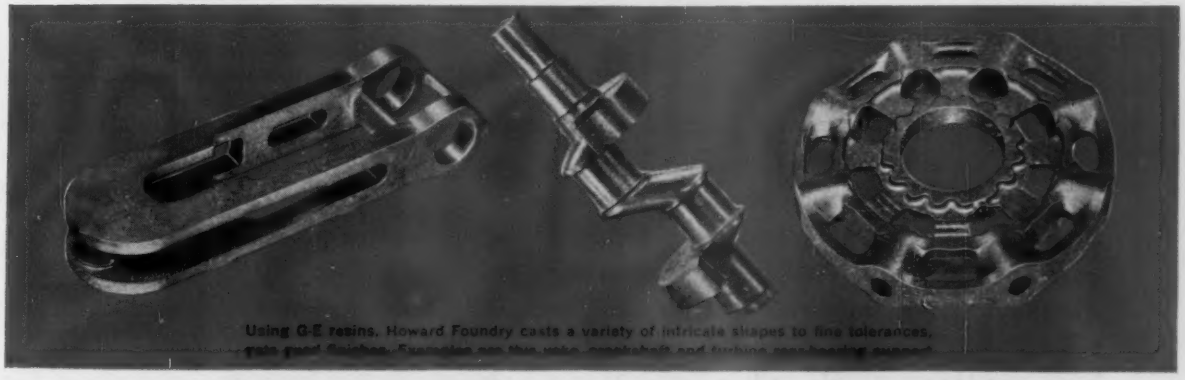
"The consistent high quality of these resins helps keep our production right on schedule."



Using G-E resins, Howard Foundry casts a variety of intricate shapes to fine tolerances,

THESE ARE THE REASONS WHY G-E SHELL MOLDING RESINS CUT COSTS FOR HOWARD FOUNDRY CO.

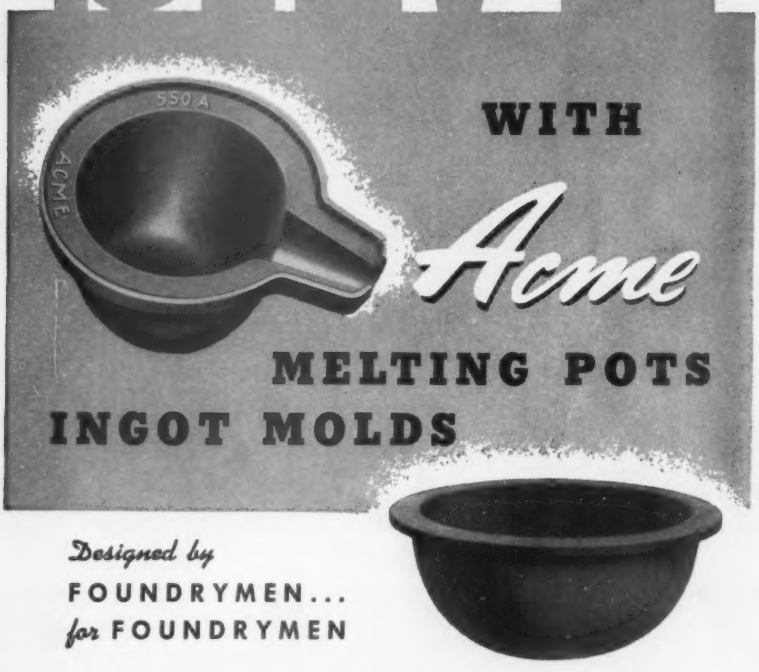
G.E. offers a wide range of shell molding resins, each designed to help you make better molds and cores. Write for technical information on G-E shell resins, and for the helpful brochure "59 Answers to Your Shell Molding Problems." General Electric Company, Section F-7, Chemical Materials Department, Pittsfield, Mass.

Progress In Phenolics

GENERAL ELECTRIC

Circle 650 on Page 51

SAVE



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INGOT MOLDS

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for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

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they are expressed in a typical grinding wheel marking.

The film is available for showing by writing to Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa

Photomicrograph Technique Is Subject of Revised Data Book

The Eastman Kodak Co. data book of elementary photomicrographic technique, *Photography through the Microscope,* now is available in a revised second edition which brings it up to date on current materials, equipment, and practices.

The 72-page volume describes and illustrates new specialized techniques and equipment and conventional techniques for making photomicrographs with a compound microscope at various magnifications. Other material covered includes equipment, films and plates, subject illumination, professional techniques, and similar topics. A series of data sheets also is bound into the book.

Copies of the revised work are available through photography dealers at 75 cents each.

University of Illinois Offers Course on Quality Control

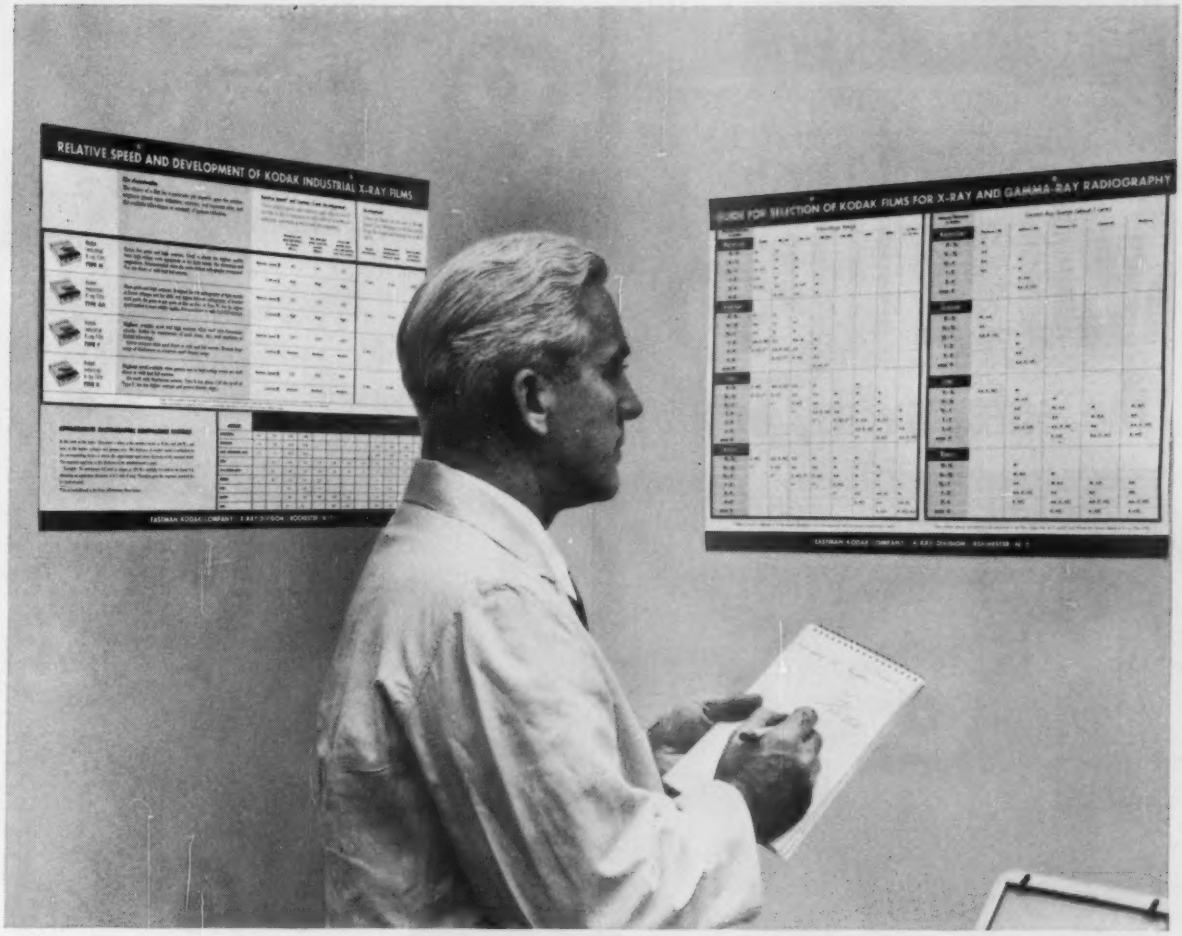
The eleventh annual short course in Quality Control by Statistical Methods will be offered by the College of Engineering, University of Illinois, with the cooperation of the Division of Engineering Extension at Urbana, March 10 through 20.

Intensive work will be given in the fields of control charts and acceptance sampling with some attention paid to the rational setting of specifications and tolerances. The course is designed for individuals in the areas of design, production, procurement, management, quality control, and inspection.

For further information, write to Prof. John A. Henry, Room 205, Mechanical Engineering Laboratory, University of Illinois, Urbana, Ill.

Truck Group Elects Officers

L. C. Daniels, general manager, Buda Div., Allis-Chalmers Mfg. Co., Milwaukee, was elected president of the Industrial Truck Association at its annual meeting in New York, Dec. 11. Philip Hill, executive vice president, Hyster Co., Portland, Oreg., was elected vice president. W. Van C. Brandt continues as managing director and secretary-treasurer.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GUIDE FOR SELECTION OF KODAK FILMS FOR X-RAY AND GAMMA-RAY RADIOGRAPHY

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Free Wall Charts give you latest information on film selection, relative speed, and contrast.

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These charts are yours—free for the asking. Just drop us a line and you'll get yours by return mail.

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X-ray Division, Rochester 4, N. Y.

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Kodak
TRADE MARK

Circle 652 on Page 51

SHEPARD NILES

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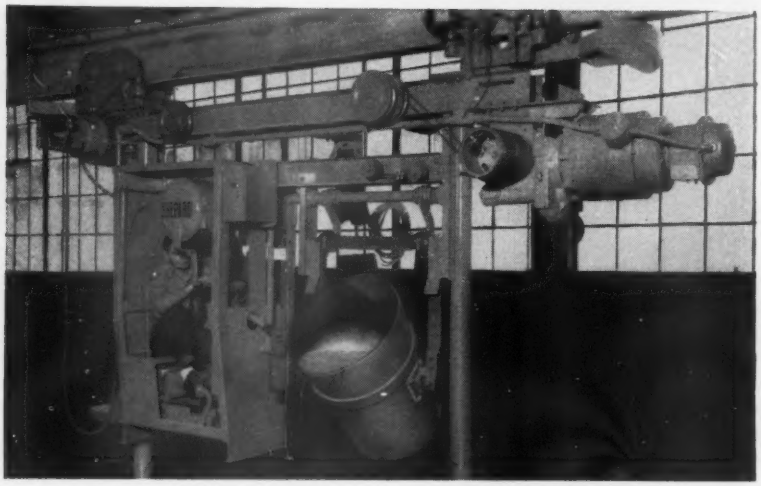
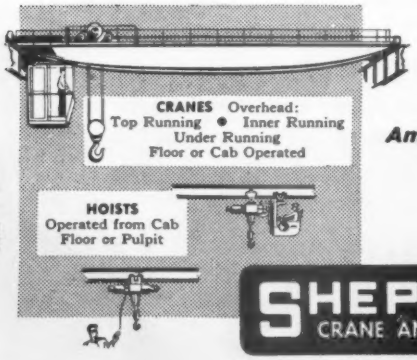
MOVE HOT METAL

the safe, swift, economical way



MECHANIZE YOUR FOUNDRY for labor-saving, low-cost handling. This modern, efficient carrier moves molten metal swiftly and safely from cupola to pouring line.

Shepard Niles cuts costs, saves manpower by enabling one man to transport and pour metal alone. The carrier operator can see perfectly for precision pouring because his cab is on the same level as the metal he's pouring.



Write for latest Bulletin on Shepard Niles Hot Metal Carriers . . . and, while you're about it, request our representative to call.

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1382 Schuyler Ave., Montour Falls, N.Y.

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Progress vs. Thoreau"

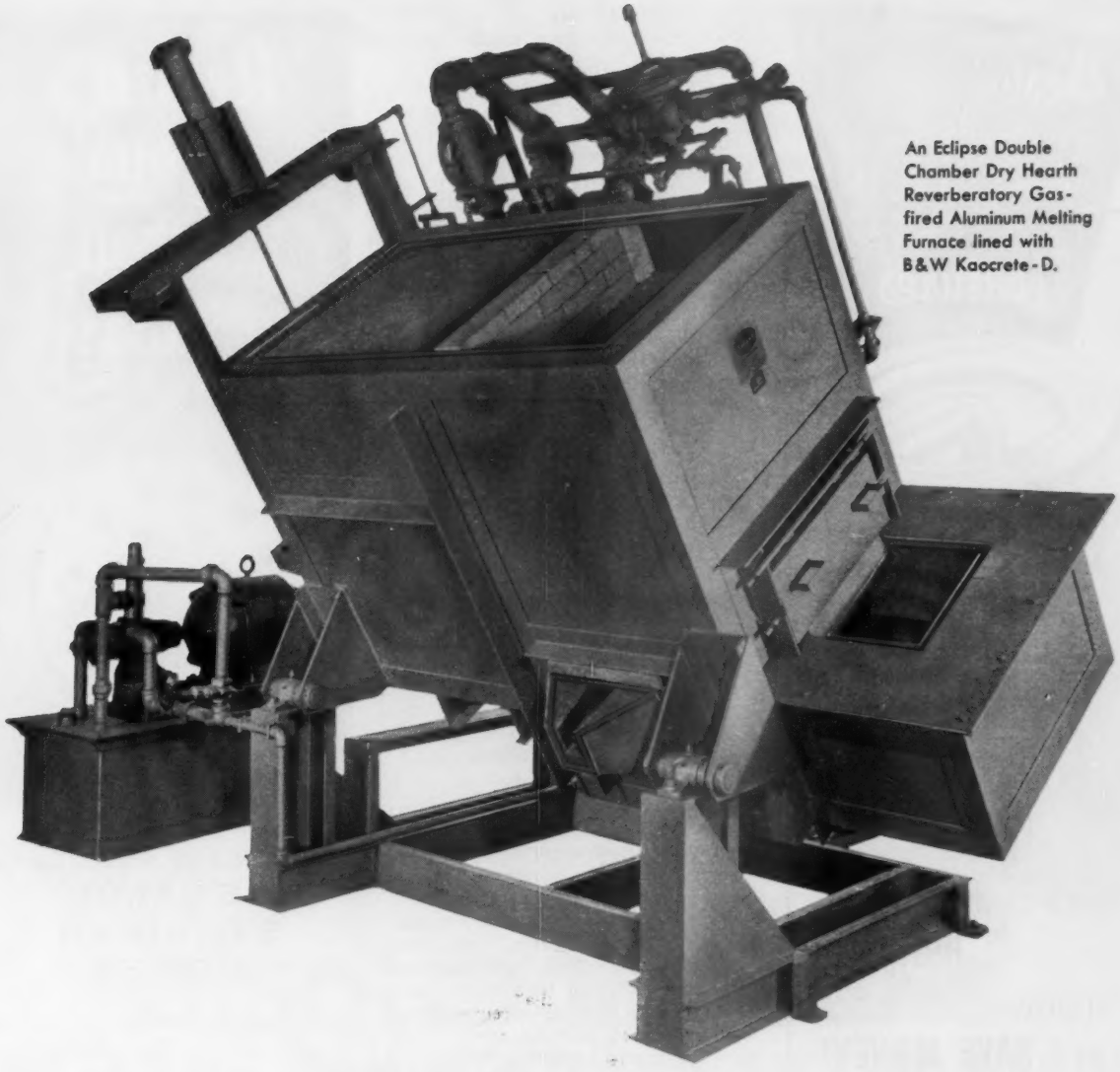
LIFE on this planet is becoming altogether too complicated. These fellows who are working on spaceships and manmade satellites probably have the right idea. Such equipment represents about the only way they can get away from it all.

Today, with a system of taxation that would drive a Philadelphia lawyer to suicide; endless lists of charities, each of which expects you to donate at least one per cent of your salary; government bureaus and regulations in such numbers that no one in the country even has them all listed; with all of these, and countless others, is it any wonder that our jails and insane asylums are overcrowded?

Yet we are told that we live in the best possible country on earth, and from the knowledge gained in my hurried travels abroad, I am in no position to deny the assertion. What will the situation be 50 years from now? Well, whatever it is, I have excellent reason for believing that I won't be here to worry about it!

Last summer, I strolled leisurely about halfway around Walden Pond, which is near Concord, Mass., and I meditated on the life of the man whose name is synonymous with that beautiful spot. He was Henry Thoreau, a quiet philosopher who lived very close to the earth he loved, and his life and thoughts were as simple and as beautiful as the philosophy he left for posterity. To him, all nature was mirrored in the placid waters of Walden.

He was a friend and neighbor of Emerson and other important men and women of the period, but to most of the so-called solid citizens of Concord, he was just a *bum*, an outcast of society, who lived like a tramp and contributed nothing to this bright



An Eclipse Double Chamber Dry Hearth Reverberatory Gas-fired Aluminum Melting Furnace lined with B&W Kaocrete-D.

Eclipse builds aluminum reverbs lined with B&W refractories

B&W Kaocrete-D provides a rugged refractory lining in this gas-fired aluminum melting furnace built by Eclipse Fuel Engineering Company of Rockford, Illinois. Equipped with an hydraulic tilting mechanism for pouring large sand castings or transferring molten metal to a holding furnace or large ladle, the furnace has separate melting and holding chambers lined with B&W Kaocrete-D.

Eclipse installs this B&W Refractory Castable in their aluminum reverbs because it provides three important benefits:

(1) The melting chamber is easy to clean since metal does not build up on or adhere to the face of B&W Kaocrete-D. That's because this refractory castable is non-wetting. Metal penetration of the contact face is kept at a minimum because of the low permeability of the castable. The refractory walls of the furnace do not require excessive scraping.

(2) B&W Kaocrete-D has unusually high strength. Combined with high density, this enables Kaocrete-D to withstand the abrasion of cleaning tools and the considerable physical abuse of charging.

(3) Kaocrete-D is easy to install. The refractory castable is simply poured and rodded in the furnace shell.

This is only one of the many applications of B&W Refractory Castables in a wide range of industrial furnaces. Why not investigate the advantages of these *specialized* refractories in your furnace designs?

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THE BABCOCK & WILCOX CO.
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GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-591

Circle 654 on Page 51

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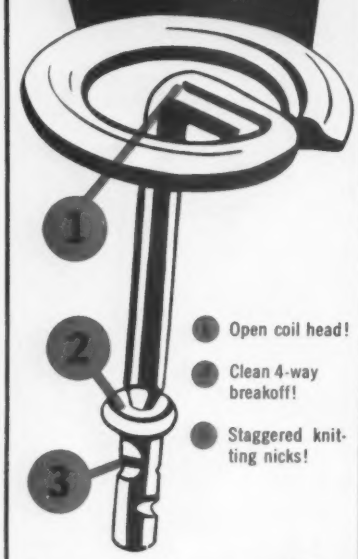

keep casting quality **HIGH!**

improve production and **SAVE MONEY!**

These sturdy open coil head chaplets make precision casting easier because they pack firmer . . . hold core position.

They leave no voids . . . and finally, they break off cleaner. What's more, they cost no more than ordinary plate heads.

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Circle 655 on Page 51

new world of ideas and inventions. Those who were more tolerant probably looked upon him as something to be pitied, a *non compos mentis* case. In modern slang, "he'd lost his marbles!"

Those who condemned and ridiculed him long since have been forgotten, but Henry Thoreau grows in stature with the passing years! Which reminds me—"Seven cities praise Old Homer—dead, through which the living Homer begged his bread!" Such is the story of fame. If Thoreau were alive today, he would, as then, be lost in the shuffle. May he rest in peace!

Yes, life is becoming more complicated, even for a sandman. When his mix consisted of just sand, clay and water, with perhaps a little seacoal added, his life was comparatively simple. He should have been a very happy man, but he probably wasn't: He needed a moisture meter. He got it!

Then he began to think of a lot of other things he needed, all of which were provided sooner than he had anticipated, and his headaches developed proportionally. Next, the *scientist* stepped into the picture with synthetic mixes and a list of devices and materials which make our sandman sigh longingly for the good old days.

Today, the stockroom of the sand department bears a rather close resemblance to a well stocked drug store. We have a variety of core oils, resins, plastic binders, insulators, exothermic reactors, and whatnot. We have materials that require heat, cold, gas, or just air (compressed or otherwise) to activate them. There are hundreds—I was tempted to say, thousands—of mysterious preparations which your foundry supplier can procure and deliver to you, if he doesn't carry them in current stock. Some—in fact, many—of these materials have been accorded universal acceptance by the trade, whereas others are greeted with varying degrees of skepticism.

Hardly a month goes by without a new product emanating from the laboratory to demand the foundryman's attention. Each has something to recommend it, and some of them have a great deal. The boys who have labored long in laboratories over these miracle agents must have a pretty good idea of what they are trying to accomplish, or they wouldn't have been kept on the job. I assume that chemists are highly paid men, and I further assume that they must, at reasonable intervals, produce results that can be translated into dollars for the boss.

During the patient and costly proc-

with Porcelain Products CERAMIC STRAINER CORES

It's a fact, that Porcelain Products *ceramic* strainer cores will reduce casting rejects — provide higher quality, slag-free castings for your customers—and save *you* money besides. Porcelain Products ceramic cores will not spall, erode or disintegrate during pouring, resulting in a foundry product free of sand inclusions. Porcelain Products cores permit controlled pouring—reduce machining time. They will withstand high heat, thermal shock—can be stored indefinitely.

Try them . . . and compare the advantages of Porcelain Products ceramic strainer cores with the sand cores made in your own plant. Write today for samples, and complete informational folder.

64 years

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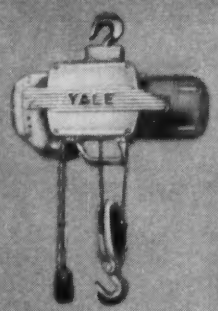
CAREY, OHIO

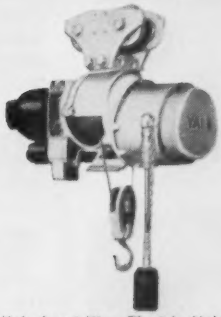
Circle 656 on Page 51

STRENGTH



Yale Cable King Electric Hoist features exclusive air-cooling system for continuous, heavy-duty lifting. Capacities: ¼ to 15 tons.

DEPENDABILITY



Yale Load King Electric Hoist: two-brake safety and quick pushbutton response. Cap: Wire Rope Model—¼ to 1 ton; Link Chain type—¼ to 1½ tons.

ECONOMY

Yale Midget King Electric Hoist works for less than two cents a day. Compact design. Lightweight. Capacities: ½ to 2 tons.

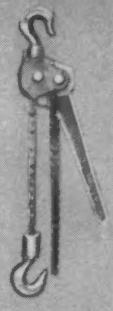
SAFETY

Yale Load King Hand Hoist with Synchromatic Load Brake gives instant braking action. High mechanical efficiency. Cap: ½ to 12 tons.

DURABILITY

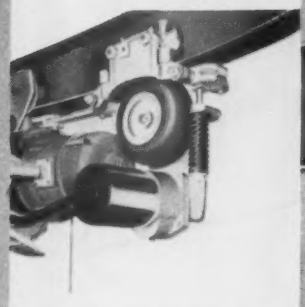
Yale Spur-Geared Chain Hoist is made of the highest quality steel for long service, constant safety. Capacities: ¼ to 40 tons.

VERSATILITY



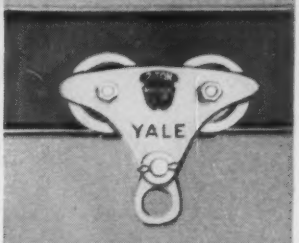
Yale Pul-Lift lifts and pulls from any angle. Portable. Capacities: roller chain model—⅜ to 15 tons; link chain model—¾ to 3 tons.

SPEED



Yale Rail King Tractor Trolley is motor-driven. Pulls any type of equipment for fast overhead handling. Capacities: ½ to 3 tons.

EFFICIENCY



Yale Plain and Geared Type Trolleys feature low headroom, low frictional loss, maximum flexibility for fast handling. Cap: ½ to 40 tons.

8 SOLID REASONS

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Will a single hoist do your job? Or do you need an integrated team? What jobs get done best with a hand hoist? Which require an electric? Is yours a trolley or stationary operation? Your Yale Hoist Distributor has the right answers.

Better still, he has the right *equipment*—a complete line of rugged, smooth-operating Yale Hoists and Trolleys. Each is engineered to provide yeoman service under tough conditions year after year.

More! You need never buy "blind". Yale's series of "Why" booklets show you the vitals of each Yale Hoist—through accurate cutaway drawings that take you inside the product. These booklets are yours for the asking. Just contact your Yale Hoist Distributor—listed in the yellow pages, or write The Yale & Towne Manufacturing Co., Phila., Pa., Dept. A-342.

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this QUAKER
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It's Quaker's Kaloric — engineered to convey hot materials at temperatures of 350°F. and above.

All Quaker Kaloric belting is made with specially-developed compounds designed to give best resistance to heat. And Kaloric's special cover resists heat that causes ordinary belt covers to harden and crack. Skim coat between plies for insulation and extra flex-life.

Available in any length . . any number of plies in widths up to 72" . . . any cover thickness. Want extra safety, extra belt life? See your Quaker-Quaker Pioneer Rubber distributor today about Kaloric conveyor belting!

For more information write:
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QUAKER RUBBER DIVISION

ess of developing a new binder, sand additive, or insulating wash, the technician not only must maintain close laboratory controls for his experiments, but he also must make his brainchild perform in the foundry. This brings him to the acid test, for it is difficult to find two foundries that are even approximately alike.

Next, he must find a cooperative foundryman who can devote the required time and attention to the tests that will be necessary. His best bet is to find a shop that is besieged with sand trouble, for it is there that the new discoveries prove most effective.

Your garrulous correspondent — who facetiously refers to himself as a sand technician—has enjoyed many interesting experiences, both with the boys who labor in the laboratories, and with those who push the product, once it has been packaged. I cuss 'em, and I love 'em,—but without 'em I'd be a dead duck! What little I know, they've taught me. All our contacts have been interesting and, for the most part, enjoyable—and some of them have paid off.

Of course, at times I try to keep too many experiments going at one time, and then, doggone it, I usually make a mess of them all. You just can't run two trains of thought on a one-track mind!

When I complain that life is becoming too complicated for me, I probably am revealing a state of mental obsolescence generally associated with old age. This world unquestionably is for young men! Who knows, perhaps tomorrow will bring atomic heat and power into the foundry, with results that are quite beyond our present conception?

The innumerable methods and materials which somehow frighten me will be taken in stride by the boys from our universities. I will be content in the hope that perhaps I can learn a little more about the hot strength factor, the control of deformation, the hot sand problems, the treatment of water to insure its maximum benefits with a minimum of danger, and a few more of yesterday's and today's *simple* problems.

But the greatest problem of all, which cries for academic attention, is this matter of understanding and controlling human thought and behavior—and I don't mean brainwashing.

How can I control my sand, when I can't even control myself?

I return in thought to the peaceful shore of Walden Pond, and to Henry Thoreau, who solved all the frustrating problems of life, at least to his own satisfaction.

Economical powder-metal-cutting and Hoeganaes Ancor-Flame Sponge Iron Powder *go hand-in-hand*

ANCOR-FLAME IRON POWDER INTRODUCED INTO THE OXYGEN STREAM, OXIDIZES RAPIDLY—INCREASES FLAME TEMPERATURE. EASILY PERMITS FLAME-CUTS OF STAINLESS STEELS AND OXIDATION-RESISTANT METALS, just as you formerly achieved in conventional cutting of low-carbon and low-alloy steels.

Hoeganaes Ancor-Flame offers you the performance advantages of uniform flow, hotter flame, cleaner and sharper cuts, faster burn, less smoke, and less powder consumption.

The physical properties of Ancor-Flame equal or surpass the highest standards set for flame-cutting iron powders.

The Hoeganaes Specialist-Engineer can give you additional facts . . . *all the facts*. His services can help you solve metal-cutting problems.

Write for your free copy. This folder fully describes physical properties of Hoeganaes Ancor-Flame; as well as why Ancor-Flame will improve your production when it comes to flame-cutting, scarfing, washing and lancing.

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HOEGANAES SPONGE IRON CORPORATION

Manufacturer of sponge iron, stainless steel, and special alloy powders for powder metallurgy, cutting and scarfing, chemical field, plastic industry, atomic energy, welding electrodes, and other industrial uses.

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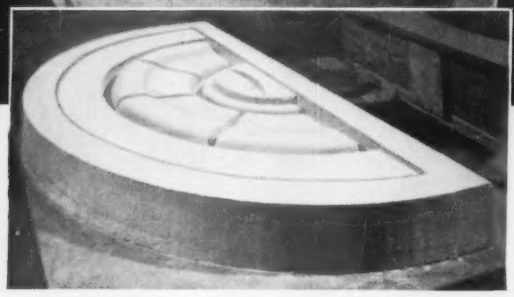
Circle 659 on Page 51

Heavy Equipment Foundry Reports:



FASTER SET-UP
EASIER SHAKEOUT
of cores made with RCI COROVIT BINDER

Big cores, like the one you see here, are commonplace at the Kennedy-Van Saun Manufacturing & Engineering Corp. in Danville, Penn. "With RCI COROVIT 7202 binder", says Mr. Harry Lynn, assistant foundry manager, "*cores that required up to 36 man-hours to produce are now finished in 12!*

"No more hand ramming is needed," Mr. Lynn explained, "COROVIT sand is simply shovelled into the box, spread out by hand, then struck off.

"In addition, COROVIT-based sand mixed with RCI's accelerator cures partially at room temperature. It hardens quickly to support itself, thereby *eliminating up to 75% of arboring, wiring, etc.*

"Another big advantage in using Reichhold COROVIT is easy shakeout every time.

"At Kennedy-Van Saun", Mr. Lynn concluded, "we plan to convert almost completely to this core binder, which gives us *the most efficient, fastest method of preparing cores that we have found to date.*"

If *you* would like full information on using this important new *self-curing* core binder, write to RCI for COROVIT BULLETIN F-11-R.

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y.

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FOUNDRY PRODUCTS
FOUNDREZ—Synthetic Resin Binders
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Creative Chemistry... Your Partner in Progress RCI

Obituary

HENRY P. SPILKER, 83, former president, Sterrit-Thomas Foundry Co., Pittsburgh, died Dec. 20, following an illness of over three years. He had been with the company since before it was incorporated in 1893. Mr. Spilker was a past director of the Gray Iron Founders' Society.

George W. Fleig, 93, for 31 years president of the Smith Facing & Supply Co., Cleveland, died Jan. 2. He retired in 1943. Mr. Fleig became secretary of the J. D. Smith Foundry & Supply Co., Cincinnati, in 1890. In 1912 he moved the firm to Cleveland and the present name was adopted.

Robert G. Cady, sales manager-treasurer, Ajax Flexible Coupling Co., Westfield, N. Y., died Dec. 12. Associated with Ajax for 27 years, at one time he was Chicago sales representative. For the last 15 years he had been handling sales at the factory and was named sales manager in 1951. Formerly secretary of the company, Mr. Cady became treasurer in 1956.

E. E. Wright, 70, former district sales manager, Electro Metallurgical Co., division of Union Carbide Corp., died Dec. 28 at his home in Florida. A graduate of Lehigh University, he joined National Carbon Co. in 1918, and in 1937 transferred to Electromet sales at Cleveland. He retired in 1953.

Anthony J. Smith, 76, for 53 years president, Enterprise Foundry Co., Detroit, died Jan. 4. His father, a former state senator, founded Enterprise Foundry in 1897, on the family farm. Mr. Smith joined the company two years later.

L. K. Spink, 58, engineer in charge of flow measurement, the Foxboro Co., Foxboro, Mass., died there Dec. 23. He joined the company's Tulsa, Okla., branch in 1924, later transferring to the factory in Foxboro.

Howard M. Greenbaum, 51, secretary-treasurer, Acme Foundry Corp., Cleveland, died Dec. 14. He attended Case Institute of Technology and after graduating from University of Illinois joined the Acme company, founded by his father.

Gabriel F. Slaughter, 85, former vice president, American Steel Foundries, Chicago, died Jan. 7. When he retired in 1944 Mr. Slaughter had been with the company 41 years.

Circle 661 on Page 51→

AUTOMATIC SAND MIXING SYSTEM NOW MAKES LARGE VOLUME SHELL MOLDING POSSIBLE

Thanks to a Planet designed and installed sand mixing system, one of the midwest's largest foundries can now make shell molds in large quantities.

The system consists of three large bins which stand 60 feet above the floor. The largest bin holds 360 tons of one type of sand. A second bin holds 80 tons of a different sand and the third bin holds resin. The resin bin is filled by means of the receiving hopper and conveyor shown in the foreground of the picture above.

Proper proportions of sand and resin are weighed and delivered automatically to a batching hopper. From the batching hopper the materials are fed by gravity to an automatic mixer where they are thoroughly mixed for delivery to molding machines.

An overhead mold conveyor system installed by Planet in the same foundry also helps secure volume production. It moves molds from the molding machines through the pouring operation and cooling tunnel to shakeout screens.

Let Planet's experienced engineers help you solve your problems — write or call today.

PLANET CORPORATION

1818 SUNSET AVE., LANSING, MICH.

• ENGINEERED HANDLING SYSTEMS
• AUTOMATED EQUIPMENT
• FOUNDRY HANDLING SYSTEMS

IT PAYS TO PLAN WITH PLANET

71

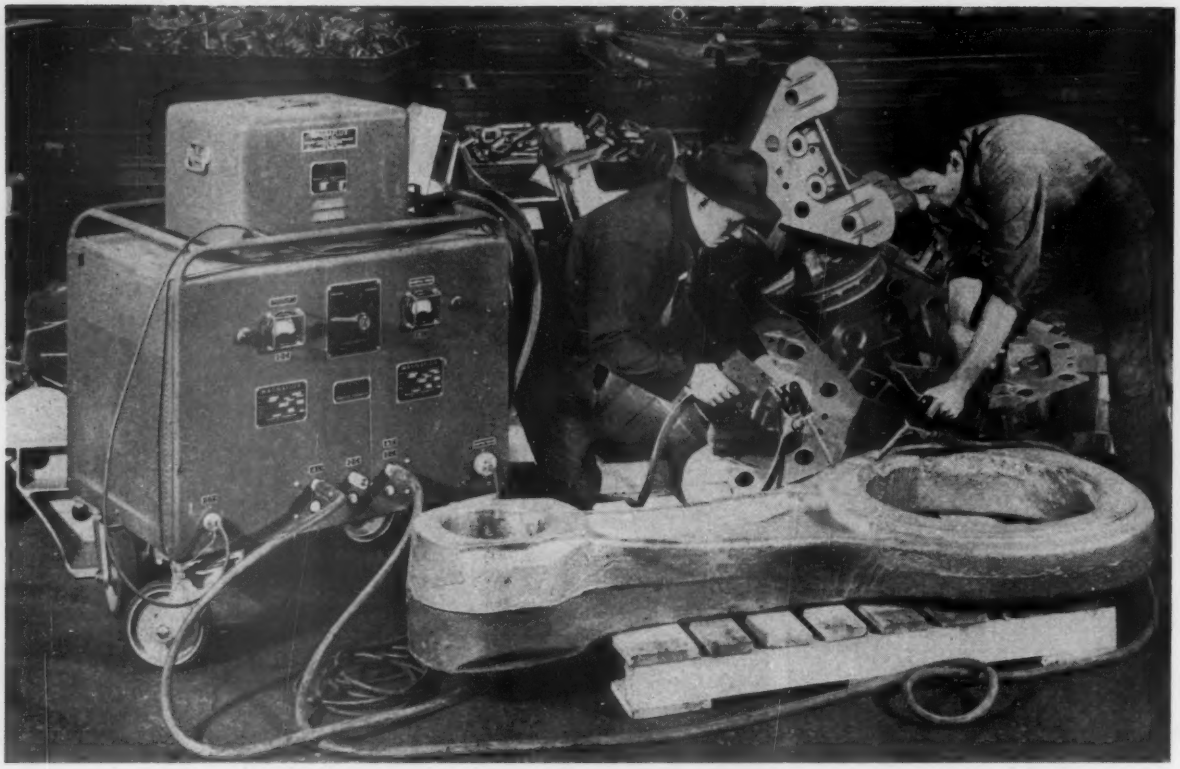


Fig. 1—Portable magnetic particle inspection unit is convenient for checking large castings. Man on left is spraying particles on magnetic field area

MAGNETIC PARTICLE INSPECTION

Of Gray Iron Castings

By ARTHUR LINDGREN
Magnaflux Corp., Chicago

IS it possible to inspect quality into a casting? Actually we can't, but if we select carefully our inspection method to suit the application, maybe we can see how inspection will contribute a great deal toward the goal of consistent quality.

We have a number of inspection methods from which to choose. Each has advantages and also limitations. Ultrasonic and eddy current instruments, except on special applications, are not too well suited to gray iron foundries. Penetrant inspection sometimes can be used, but as a control tool it can become too expensive. Ringing of castings has been done for years. Where there is a good inspector and only large defects to eliminate, it can be worked right in with visual inspection at little extra cost.

Waiting for customer machining to do our inspection is both dangerous and costly. Irritated customers often don't return. Besides, if we wait that long, it's difficult to find out exactly where trouble is occurring. It may not even be happening in the foundry.

Visual inspection is a must. Core blows from perhaps too much moisture or oil in the sand can easily be picked up here and the trouble eliminated. A number of other types of defects show up under visual inspection, and although it is expensive to inspect every piece, it is almost a must.

What It Is—Because magnetic particle inspection comes in many forms, a brief description of the method would be in order. Essentially, Magnaflux inspection consists of making the casting into a temporary magnet. Remember how we used to pick up a nail with a horseshoe magnet? It stuck to the two pole pieces. So will iron filings. If we bend these two poles so that they touch, we can still pick up the filings. The north and south poles are still present. A crack in a casting also will create north and south poles. If we sprinkle magnetic particles all over the surface of the casting at the same time it is magnetized, these particles will line up right on top of any crack-like defect. The defect is then visible right on the casting. Note, however, that the particles will not cling to a porous area unless it is "in-line" porosity—something like a crack.

There are several ways of magnetizing and several different types

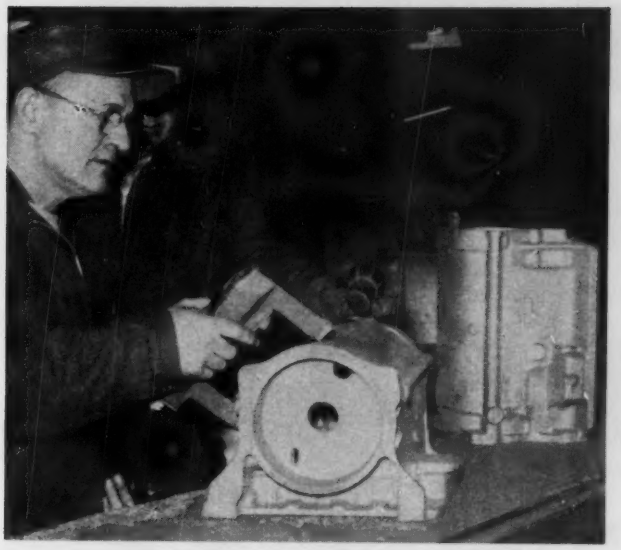


Fig. 2—Inspecting gray iron transmission housings with a yoke, the most widely used magnetizing tool

Fig. 3—Inspection of small castings is fast when viewed under black light on this Magnaglo machine

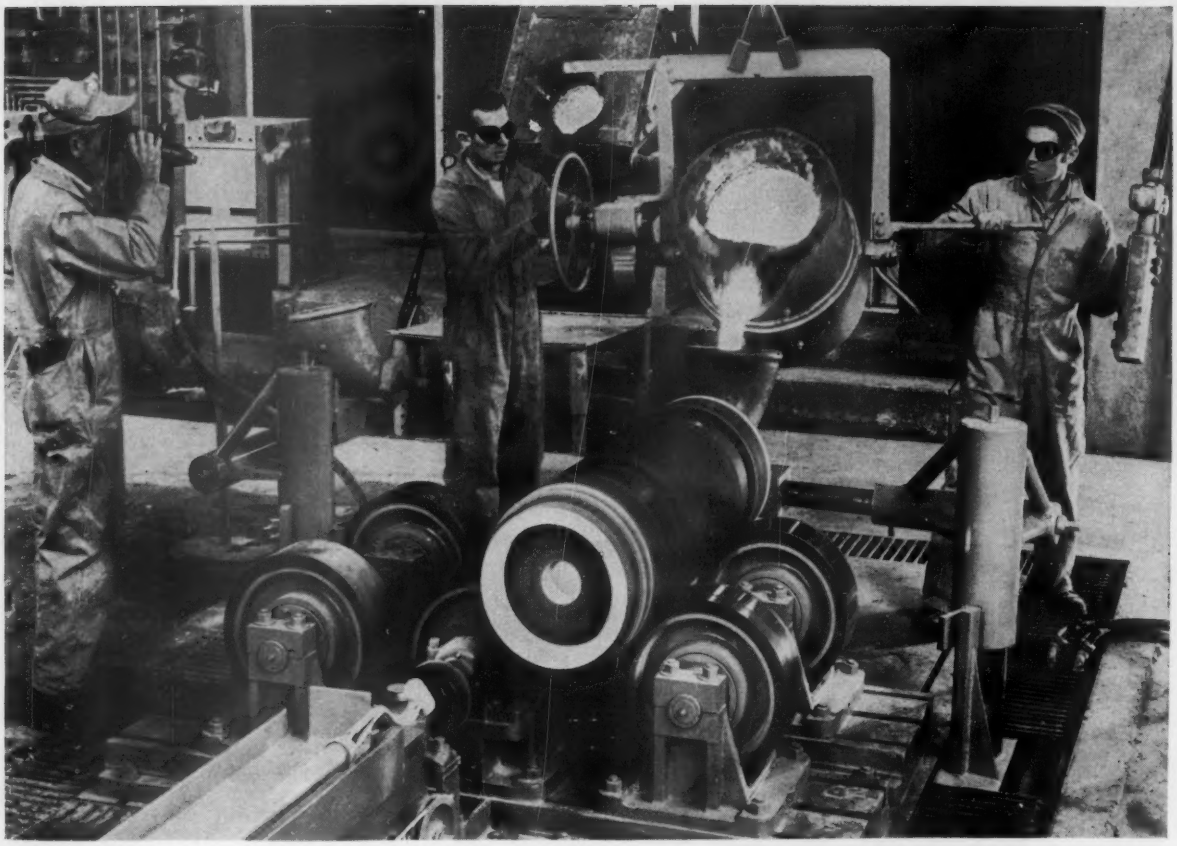
Fig. 4—Types of cracks revealed by fluorescent magnetic particle inspection. Crack in second casting from left is on a gasket surface and could lead to leakage problems. Another potential leaker is shown at top right. The hot crack in the bottom casting at right is a major problem in permanent mold casting of gray iron

of magnetic particles. A yoke is probably the easiest and most widely used magnetizing tool in the gray iron foundry (Fig. 2). The inspector merely sets it on a casting and sprinkles red, gray or black magnetic particles in the area between the poles.

This type of inspecting can also take the form of fluorescent magnetic particles, called Magnaglo (Fig. 3). In this case, the casting is magnetized on a machine. Magnetic particles are coated with a fluorescent dye and mixed in a very light oil. This suspension is flowed over the part as it is being magnetized. Defects are indicated by brilliant lines under black light. Castings can be checked rapidly, whether the dry magnetic particles or the liquid suspension of fluorescent magnetic particles is used. The fluorescent method is more rapid on small castings, while large parts are generally inspected with the dry method.

What types of defects are of most concern? Let's consider hot cracks first. In most instances they aren't too bothersome. Generally they are believed to be caused by (1) shaking out too quickly after pouring, (2) too hard a core, or (3) a thin section which almost defies diagnosis. Often they can be seen visually, but there are cases where they are almost invisible.

Tracing the Cause—How can we tell a hot crack from a handling crack? Frequently its location will give us the answer. Another indicator used is to break the casting



WHY GOOD CENTRIFUGAL CASTING DEMANDS INDUCTION MELTING

Though centrifugal casting has values apart from any melting furnace used, it achieves its ultimate performance only with induction melted metals. You may have wondered yourself why the vast majority of critical centrifugal castings are poured from Ajax-Northrup induction furnaces. The reasons are many—

Take purity for example. One major advantage of centrifugal casting is that the spinning concentrates impurities such as dirt, slag particles, even gas, at the internal skin, where they can be machined away easily. Obviously, the purer the melt, the thinner the skin to be machined. And Ajax-Northrup induction melting has proved itself many times over to be the purest melting method known!

Or take uniformity. The electromagnetic stirring action inherent in the Ajax-Northrup induction furnace assures absolute uniformity of chemical composition and temperature throughout the melt, resulting in consistently homogeneous castings, even with alloys containing metals of widely varying densities such as Al, Ni, and Mo. In fact, users have been able to eliminate uniformity tests on Ajax melted centrifugal castings entirely.

The precise metal temperature control available with Ajax-Northrup induction equipment is another important consideration in the production of consistently uniform castings. Hot and cold pours are eliminated. And this combination of ideal temperature control and perfect mixing adds up to good, reproducible results.

Ajax-Northrup induction melting equipment, with its unique control system offers you maximum melting efficiency with resulting lower melting costs. The new compact designs incorporate many features which minimize floor space requirements, drastically reduce installation costs, minimize maintenance, and provide simple, more efficient operation.

Induction heating & melting

AJAX

NORTHRUP

Whether you're centrifugal casting tiny investment castings, massive rolls, or critical jet engine tail sections, you're sure to find an Ajax furnace that satisfies your needs perfectly. We'll gladly send you further information, or, if you wish, arrange a meeting with qualified furnace engineers to discuss your special requirements. Ajax Electrothermic Corporation, Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION

and note the color of the fracture. If the crack has formed when the casting was over 300° F, a black appearance is usually in evidence.

Fig. 4 includes a view of a gray iron starter housing, a permanent mold casting made by Delco-Remy Div. of General Motors Corp. Dave Garrison, supervisor of inspection, tells us that hot cracks are one of the major problems in permanent mold work. Surprisingly enough, handling cracks are at a minimum. He uses Magnaglo mainly to sample production runs on the more critical shapes. With equipment made for his type of inspection, his men find no difficulty in interpreting what they see at a glance.

Sometimes cold shuts can offer a problem until their source is found.

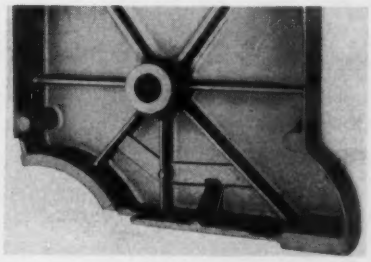


Fig. 5—Stress and handling cracks in this base were eliminated when two upper ribs were enlarged and extra rib was added at the bottom

Some foundrymen won't have any part of castings so affected. Others examine them more closely, and, if (1) the cold shut has not greatly decreased the cross section of the casting, (2) if the castings do not look too bad visually, and (3) if the cold shut does not show up under magnetic particle inspection, they will accept the castings. Actually, if there is a solid joining of the metal, Magnaflux won't show cold shuts. The castings then are just as bad as they look visually—no more. Many castings can be salvaged by a minor amount of grinding, if one is sure a crack is not present.

Shrink can cause difficulties on large castings. If the shrink crack is on the surface or near the surface, it is readily picked up with dry magnetic powder. Usually the yoke is used, but at times a larger, portable power pack is required (Fig. 1).

Another defect noted a little more frequently is the stress crack. Some are seen easily with the naked eye, others are too tight to see. The power tool base, Fig. 5, made by Dalton Foundries Inc., Warsaw, Ind., shows a bit of ingenuity in the making. Note that two of the ribs are heavier than the others. In this case, they were the main feeding runners. Stress cracks began to appear between them and the center post. Solution—make them heavier, and add more material to blend out the radius of each supporting rib as it joins the center section. That stiffener on the lower edge has been added to stop a handling crack problem. Visual inspection discovered the need for redesign; sample Magnaglo inspection showed Dalton's solution to be correct.

Handling Defects—Now let's take a good look at handling defects. First of all, how do we know they are handling cracks? Most foundrymen look for the tell-tale mark where the casting has been given a sharp blow. A good many occur at shakeout. When they run down the source of trouble, the usual method is to inspect a sample group directly out of shakeout, before cleaning. Magnetic particle inspection will show through the thin layer of sand. Handling cracks also occur during core removal. This is particularly true on large supercharger type castings. While removing the gate, a slip of the hammer can also mean trouble.

Cleaning operations, however, by far exceed all other sources of handling cracks. In blast cleaning we may be trying to clean too many castings at a time in the barrel. Loading into the skip hoist or hand unloading from the unit also can lead to trouble. Even the table blast can be the culprit. Here, it is a matter of how carefully the operator sets down his castings. Dumping castings of complicated shape into hoppers during trimming, grinding, and final visual inspection also bears watching. Even the final operation of bagging has been known to initiate handling cracks.

The defect in the housing shown in Fig. 4 is definitely handling. By taking a few castings from various operations for test, the trouble was pinpointed to an operator unloading them too fast from the blasting machine. When the operator was shown what his rough handling was doing, trouble stopped at once.

Handling cracks can be costly. We recently ran across an end housing where an expander was used on the ID during machining. Each crack almost invariably meant $500 worth of broken tools and lost machining time. In a similar case, a handling crack meant that a gasket fit was no longer possible, resulting in a leaker during assembly.

Pinpoints the Trouble—Although running down the source of trouble is important, George King of Atlas Foundry Co., Marion, Ind., found magnetic particle inspection impor-

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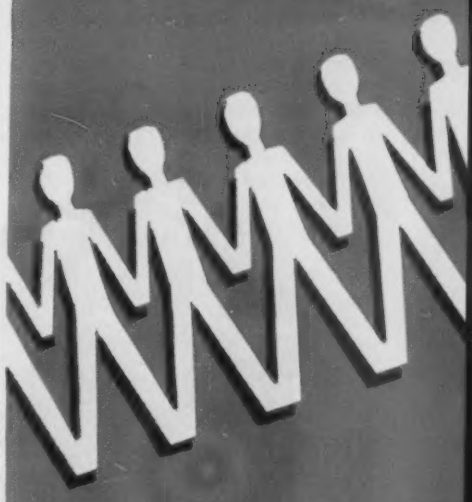

UNIFORMITY

If you've had disappointing variations in monthly control of blast cleaning costs—try Malleabrasive.

Malleabrasive has the uniformity of metallurgical structure from one lot to the next that has leveled out the cost chart line in many of America's largest foundries and other metal working plants. Not only leveled—but lowered!

The full and complete Malleabrasive process itself—used by ourselves exclusively—provides a degree of uniformity unmatched in the metal abrasive field.

Whatever your blast cleaning job, Malleabrasive will do it well, and will repeat uniformly, from month to month. Write us for information.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO.
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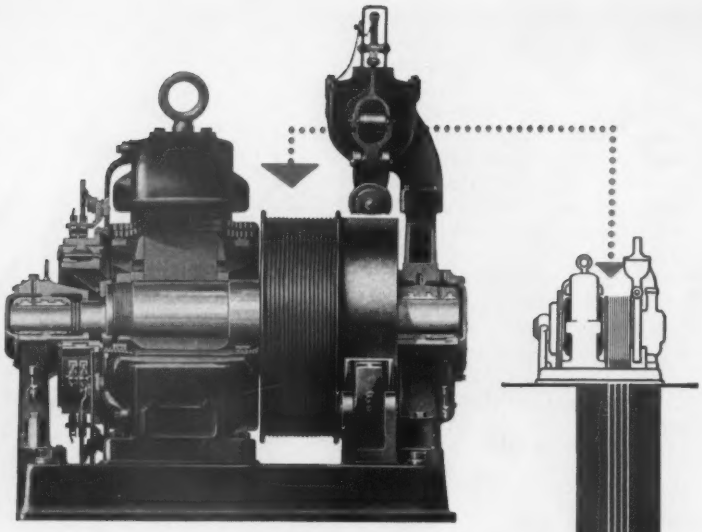
Sold by Pangborn Corp., Hagerstown, Md. and by many leading distributors of foundry supplies from coast to coast.



Otis Elevators Use HANNA PIG IRON

to support their ups and downs

Rough finishing a one-piece sheave rim and brake pulley casting in the Otis Elevator Company's Yonkers foundry.

Center of action in the mechanism of Otis Elevator Company's high-speed (up to 1,400 ft. per minute) Autotronic passenger elevators is the one-piece cast iron drum shown in place in the top picture and in rough form below. Half of the drum serves as a sheave rim for the elevator's cables, the other half as a brake pulley. To maintain the high standards of quality and performance demanded of these drums, Otis Elevator's foundry at Yonkers, N. Y., casts them with Hanna Pig Iron.

The Hanna range includes the Hanna 38-pound pig, the foundryman's favorite standard, in all grades, silvery and HannaTite, a specially controlled, close-grain iron. Also available is the HannaTen, a smaller ingot, with finer grain structure and no free carbon pockets. For prompt, expert handling of your pig iron requirements, call your Hanna representative at any time

HANNA
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THE HANNA FURNACE CORPORATION
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tant in another way too. To him, it means co-operation between foremen. One quick check pinpoints the trouble and everyone pitches in to clear it up. After a year now, some critical castings are still on 100 per cent inspection, but most are on a sampling plan.

Let's take a look at some leaker problems. The manifold pipe shown in Fig. 4 has been given a rather sharp blow on the outside. Frequently, defects such as this, as shown on the inside, do not progress outward until later. When they do, leakage and possible failure result. The defect in the adapter housing of Fig. 4 could also result in a leaker problem if gone undetected. Whether it be on the inside or the outside, as long as one can get to the critical surface with black light, the fluorescent line will tell the story. These last two castings took about 20 seconds each to check—faster than a good visual inspection.

The transmission cases in Fig. 2 took a little time to work out all the stress conditions involved. In the end, J. A. Nelson, general manager of Hoosier Iron Works, Kokomo, Ind., says it was well worth it, because his customer was kept happy. More than a dozen changes were made in this casting before the foundry was satisfied that no failures would be encountered. At times, it meant inspection right on the line. If a stress crack existed, it was located quickly.

Les Welty, quality control manager of Dodge Mfg. Corp., Mishawaka, Ind., says finding handling cracks during machining can become expensive. He solved the problem by going to 100 per cent inspection on the gray iron castings used in their own high-quality speed reducers. By saving over $4000 in the first year, they proved to themselves that reliable quality goes right along with lower cost.

Foundrymen say it is not difficult to train inspectors for this type of inspection. By choosing the right method, a good inspector needs very little training. He already knows where the critical areas are. If he finds a casting cracked, he sees it right on the casting, before the customer finds it in his machining or service. If it isn't cracked, he can see that too. There is no doubt in his mind.

Here's what can be done to make industry in general look to the foundry and think of engineered, reliable, yet low-cost castings.

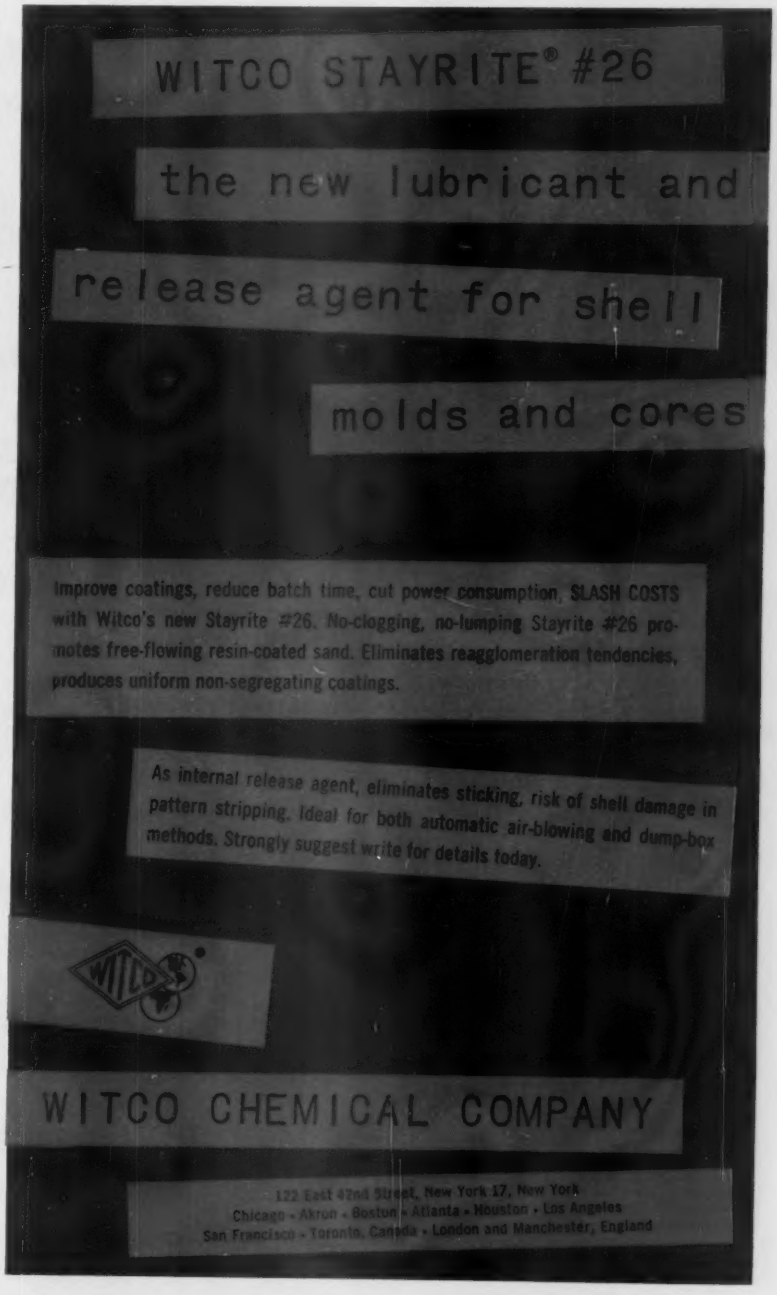
1. We can help our customers with their design problems. If a part fails in service because of poor design, the chances are it will fail through a defect or stress raiser, and the foundry could be blamed for lack of dependability. Correct design means satisfactory service and more foundry business.

2. We can check our pilot runs very closely. Remember, some defects cannot be seen by the unaided eye, but they seem to always show up when least expected. The right time to find them is when they first occur; then use your know-how to correct the offending conditions.

3. Constantly sample inspect all critical runs. With magnetic particle you can readily run down the cause and take appropriate corrective action.

4. Even on a long-standing repeat order, when trouble is indicated, change the design with the customer's help. If your customer can be assured that there are no minor defects in the areas of highest stress, there should be no need to look elsewhere, and your over-all inspection cost is reduced.

Acknowledgment — Grateful acknowledgment is given to all those foundries mentioned for their help not only in supplying sample cast-


WITCO STAYRITE® #26
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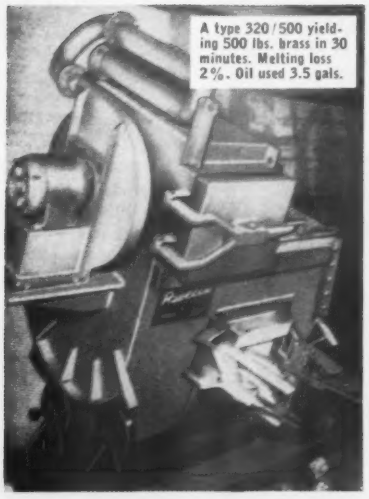

REVECON *furnaces*

PAY OFF IN SAVINGS THAT COUNT

A wise investment for any foundry, Revecon furnaces are the modern way to efficiency in melting. Save fuel . . . save crucibles . . . save metal loss . . . save time, floorspace and labor costs! Revecon furnaces are designed to accommodate capacities from 50 lbs. to 10 tons using oil, gas or coke.

Write today for—"Efficiency in Melting The Revecon Way."

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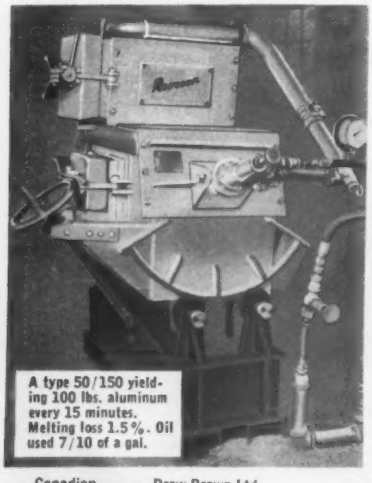

Canadian Representative: Drew Brown Ltd. 5410 Ferrier St., Montreal 9

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ings but in furnishing the data for this article.

Editor's note: This paper was presented before the 1957 Wisconsin Regional Foundry Conference in Milwaukee.

Cost Reduction Conference To Be Held in Cleveland

An all-day conference on cost reduction, "Putting the Squeeze on Costs," has been organized by members of the Factory Management & Maintenance Div., Cleveland Engineering Society. It will be held Monday, Feb. 17, at society headquarters, 2136 E. 19th St., Cleveland, and will be open to factory management and maintenance men.

The eight sessions on the program will begin at 9 a.m. and conclude at 10 p.m. Topics to be covered include "Integrated Cost Reduction," "The Importance of Plant Layout and Material Handling in Cost Reduction," "Planning and Scheduling's Contribution to the Reduction of Manufacturing Costs" "Controlling Overhead's Costs," "The Role of Work Simplification in Cost Reduction," "Slicing Costs Through Better Inventory Control," "How To Save Dollars With Better Tool Control," and "Planning on Reducing Tomorrow's Costs."

Metal Treating Institute Meets, Elects Officers

The 42nd annual meeting of the Metal Treating Institute was held at the Hotel Sheraton, Chicago, Nov. 1-3. A feature of the meeting was a luncheon attended by nearly 30 foreign representatives to the second World Metallurgical Congress. From nine foreign countries, they were members of a division called "Group IV—Heat Treatment," and partici-

"Good Gosh, Harry, biting is no longer considered a good metallurgical test!"

PYRO LANCE

get below surface readings for greater accuracy

Temperature readings of molten nonferrous metals are only accurate when taken below the surface, unaffected by dross and other surface conditions. That is why there is industry-wide acceptance of the Alnor Pyro Lance.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip. Enclosed couple is protected against flame, fumes and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

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PRECISION INSTRUMENTS FOR EVERY INDUSTRY

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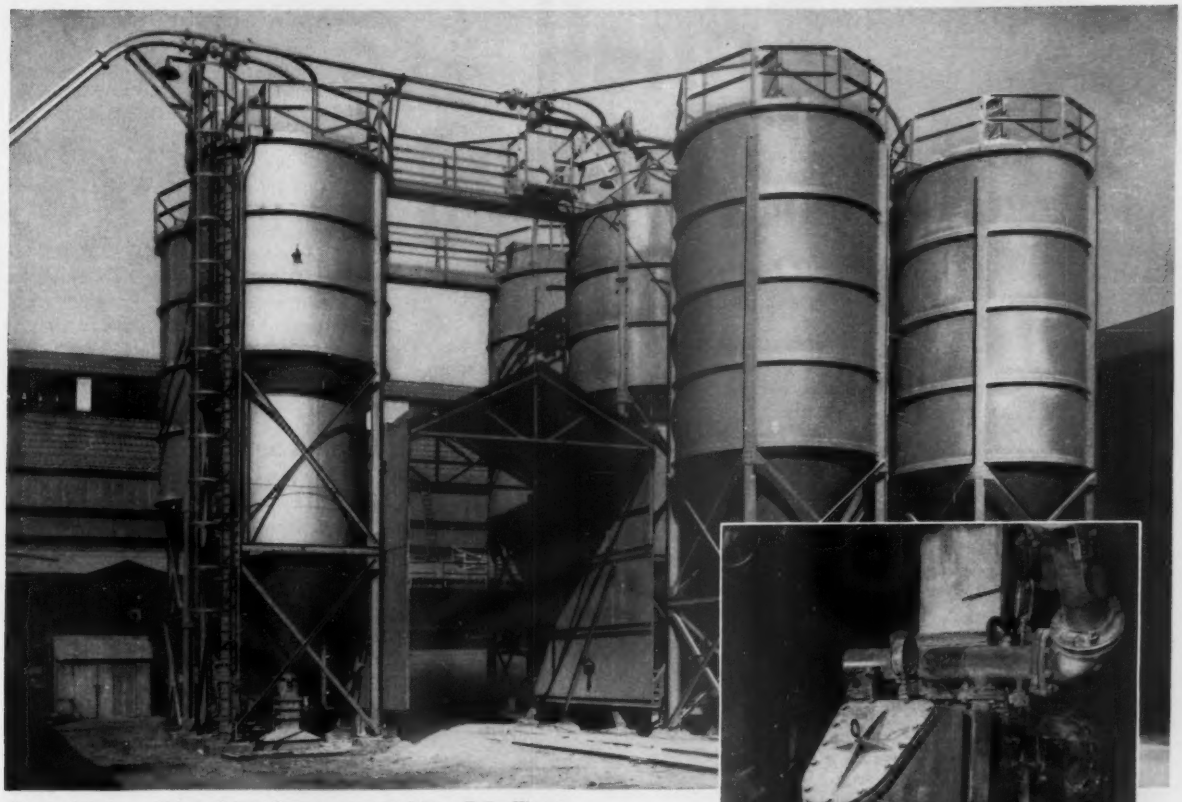

Storage bins into which sand ingredients are conveyed by a Fuller-Kinyon Conveying System. Note the pipe-line system which permits ingredients to be conveyed into their respective bins.

One of two Fuller-Kinyon Pumps which convey sand ingredients to storage bins and from bins to mixers.

FULLER-KINYON CONVEYING SYSTEM HANDLES THREE DIFFERENT MATERIALS EFFICIENTLY, WITHOUT WASTE

To reduce costs and speed up handling of foundry sand ingredients with minimum waste, General Steel Castings Corporation, Granite City, Illinois, installed a Fuller-Kinyon Conveying System.

Here's what it does for them—

The system unloads corn flour, silica flour and bentonite from hopper bottom cars by means of Fuller-Kinyon Pumps which convey these materials through pipe lines to a number of storage bins. The flexibility of the system makes it possible to unload cars in a fraction of the time that would be required manually, *and*, waste due to spillage is eliminated. Two pumps used in the operation can be moved on narrow gage tracks for spotting under cars or bins. One pump is used mainly for unloading and delivery to storage—the other for delivery from storage to supply bins above the mixers. However, it is possible to unload cars and reclaim from storage simultaneously. Where bins are located so that they cannot discharge directly to a pump, an F-H Airslide® conveys from bins to the pump.

Prior to the Fuller installation, material was received in bags and manually unloaded, stored and transported to the mixers. It figures—*costs were much higher*. Now, waste has been eliminated! Another important feature—the company has realized extra savings by purchasing materials in bulk.

Fuller air-conveying systems are in operation in hundreds of plants throughout industry, cutting costs and increasing profits, day in and day out. The next time you have a materials-handling problem, why not get in touch with Fuller . . . chances are you will also profit.

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Brinell Testing

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This direct reading Brinell hardness tester tests round or flat parts *fast*. No grinding of parts is necessary and the operator simply notes that the dial indicator needle falls between pre-set tolerance hands.

Hydraulically applied standard Brinell test loads are used. Foot control allows operator to test parts as quickly as he can move them through the machine.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

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Circle 667 on Page 51

Foundry Saves 12½ Hours With Arcair

Vancouver Iron Works, in British Columbia, uses the Arcair Process for removing excess metal from reaction-type turbine castings—"used to take 14 hours to remove the 2¾" thick, 6" high, 16" long metal. Arcair does it in 1½ hours and no cleanup is needed." Savings on over-all preparation cost—65%. This is typical of many jobs throughout industry where the Arcair process saves both time and costs. The process consists of a torch, a special type of electrode, ordinary shop air and an ordinary D.C. welding machine.

Write Arcair today for this new case history booklet.

Arcair Metal Removal Torches

465 S. Mt. Pleasant St., Lancaster, Ohio

pated in a discussion of "Commercial Heat Treating Here and Abroad."

Presentation of the annual MTI Achievement Award was made to Paul D. Frost, chief, Light Metals Div., Battelle Memorial Institute, Columbus, Ohio, for an article and lecture on heat treatment of titanium.

New officers include K. U. Jenks, Lindberg Steel Treating Co., Melrose Park, Ill., president; A. T. Ridinger, Metallurgical Inc., Minneapolis, vice president; and L. G. Field, Greenman Steel Treating Co., Worcester, Mass., treasurer.

AMCA Sets Up Program To Certify Product Ratings

Advance details of an international program to protect specifiers and users of such air moving equipment as centrifugal, axial, and propeller fans and power roof-ventilators against incorrect or improper performance ratings have been revealed by the Air Moving & Conditioning Association.

The result of almost two years of AMCA planning, the program provides a means of identifying properly tested and accurately rated products. The AMCA standard test code sets up a uniform procedure for such testing and rating.

To qualify his products for the program, a manufacturer must make all tests and performance ratings in a test laboratory inspected and approved by AMCA during an actual test. The job of inspecting and qualifying test laboratories in this country and Canada and of checking test and performance data provided by each manufacturer now is in progress. Jan. 2, 1958, was the target date for completion of this work and announcement of complete details of the program, including a list of approved test laboratories and names of participating manufacturers.

AMA Course Is on Production Planning and Control

Three-week courses in production planning and control are being offered by the American Management Association. Designed to help manufacturing managers level off peaks and valleys in production cycles, the courses will systematically review current methods of inventory control, distribution, forecasting, production scheduling, data processing, and automation.

Training methods will include simulations of actual situations, lectures

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by guest speakers, training films, group discussion, case studies, role playing, and problem-solving workshops.

Information concerning dates and registration can be obtained from the Registrar, American Management Association, 1515 Broadway, New York 36, N. Y.

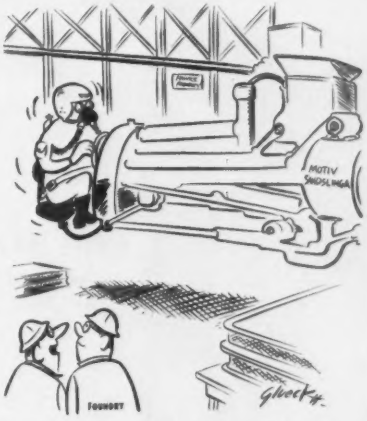
Aircraft Castings Association Organized, Elects Officers

Officers recently were elected by the newly formed Aircraft Castings Association. This group has been formed to promote and develop an expanded interest, acceptance, and use of ferrous castings made from nonexpendable patterns, among companies manufacturing aircraft, missiles, and related products.

Charter member foundries are Pacific Alloy Engineering Corp., El Cajon, Calif.; Electric Steel Foundry Co., Portland, Oreg.; Stanley Foundries Inc., Huntington Park, Calif.; Lebanon Steel Foundry, Lebanon, Pa.; Hanford Foundry Co., San Bernardino, Calif.; General Metals Corp., Oakland, Calif., and High Integrity Cast Alloys Inc., Shreveport, La.

Newly elected officers are: President, Allen M. Slichter, president, Pacific Alloy Engineering Corp. and Pelton Steel Casting Co., Milwaukee; vice president, Charles E. Haney, works manager, Electric Steel Foundry Co., and secretary-treasurer, William W. Stevens, partner, Stanley Foundries Inc. The three also are directors of the group.

Any firm, partnership, or corporation manufacturing and selling ferrous castings from nonexpendable patterns suitable for aircraft, missile, and related industries, and possessing the necessary facilities and personnel to advance the objectives of the association, is eligible for membership.



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Highest Quality Foundry Coke

Consistently high in carbon and low in sulphur and ash . . . highly resistant to shatter and abrasion, Milwaukee Solvay has hundreds of satisfied users. It has remained the foundryman's choice for *over 50 years.*

If you are not already a user, may we ship you a *trial* car?

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Union Casting Company, Middlesex, New Jersey, bought two Tabor Top-Squeezers in 1946. "Ten years of day-in-day-out production with pennies for maintenance" — that's the report of John von See, President.

With this Tabor jolt-squeeze machine, the first cost is the lowest on today's market. Table size is 16"x19". Squeeze cylinder is 10" diameter. Squeeze pressure relief valve, to assure uniform density on similar molds, is optional. The squeeze unit is fully enclosed and off the floor — protected from sand, dirt and dust.

Each machine in the Tabor line has mechanized muscles to give you more castings per hour, less downtime per machine. Write for Condensed Catalog or ask to see the Tabor Man—the technical man.

TABOR

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 192

LIFTING MAGNET

All-steel lifting magnet weighs 6750 lb and features one-piece construction in which the outer pole shoe, inner pole shoe, and top case are embodied in a single steel casting. The 61-in.-diam magnet is wound with strip aluminum and has an operating current of 56 amps. Designed for use in the scrap industry, the manufacturer reports the magnet is ideal for any type of operation in which turnings, borings, small thin gage punchings or other scrap of similar nature must be handled. The magnet can be supplied for all standard and special voltages for use with or without Ohio controllers.—Made by **Ohio Electric Mfg. Co.,** 5400 Dunham Rd., Maple Heights, Ohio.

For More Details Circle No. 401—Page 192

COPE AND DRAG SEALER

Extruded plastic sealing compound provides a joint seal between cope and drag to prevent fins and runouts. The material is inert and reportedly will not react with molten metal. Sand Gaskets, as the material is called, disintegrate completely to a light gray ash in 10 minutes at 1150° F. The sealer has a long shelf life, does not dry out, and is always ready for use regardless of storage time. It is available in 32-in. lengths in 3/16, ¼, ⅜, ½, ⅝, and ¾-in. diams. —Made by **Thiem Products Inc.,** Milwaukee 19, Wis.

For More Details Circle No. 402—Page 192

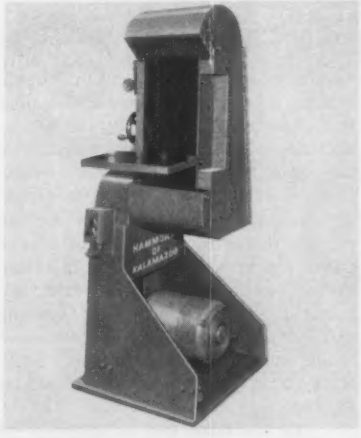
AIR COMPRESSOR

Intermediate-size, stationary air compressor has a free air delivery ranging from 570 to 680 cfm at 100 psi and is available for either permanent installation or as a skid-mounted unit. The AR-3 unit weighs 5400 lb and draws 600 gpm of cooling water at 60° F. The new compressor measures 41 in. wide x 60 in. deep x 72 in. high. Made by **Atlas Copco Eastern Inc.,** Paterson, N. Y.

For More Details Circle No. 403—Page 192

ABRASIVE BELT GRINDER

Model PD-10-in. abrasive belt grinder is suited for dry, flat surface grinding, polishing, and deburring of castings, diecastings, forgings, wood, and similar parts. Simple adjustments permit vertical or horizontal operation. A 10 x 21 in. steel



platen can be reversed top for bottom and side for side. Platen offers a working surface large enough to allow parts to contact the entire width of the belt. Automatic air or spring belt tensioning is available. Standard belt speed is 3800 sfpm, but other speeds can be supplied. Made by **Hammond Machinery Builders,** 1605 Douglas Ave., Kalamazoo, Mich.

For More Details Circle No. 404—Page 192

CONVEYOR BELT LACING

High-strength flexible lacing for troughed conveyor belts is designed for quick, simple installation through elimination of need for templates, drilling, or hole punching. Design

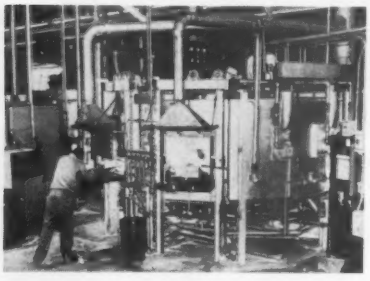
permits installation of the splice in one piece. As the conveyor operates, the hinge plate separates into sections at prescored notches to conform with conveyor trough curvature. The hinge type splice reportedly can go around small diameter pulleys smoothly. The splice is available for belts from 3/16 to ¾ in. thick and up to 60 in. wide.—Made by **General Splice Corp.,** 85 Spring St., South Norwalk, Conn.

For More Details Circle No. 405—Page 192

HEAT TREATING FURNACE

High production heat treating furnace performs both preheat and high heat operations and features a doughnut-shaped rotary hearth with separate charge and unload doors. The furnace has an over-all diameter of

13 ft and can produce over 400 lb per hr of treated work. Temperatures to 2400° F are possible in the high heat section. The low-temperature zone is heated by seven return bend gas-fired radiant tubes of closed head type. The high-temperature zone is heated by 12 refractory type electric resistance elements connected through a step transformer with tap changing switches. Following the high heat



zone there is a cooling section which lowers the temperature of the hearth to minimize thermal shock on cold parts loaded onto the hearth through the charging door.—Made by **Holcroft & Co.**, 6545 Epworth Blvd., Detroit 10, Mich.

For More Details Circle No. 406—Page 192

LAMINATING TOOL

Fiber-Resin Depositor is a three-way gun which sprays activated resin and chopped fiber-glass strands simultaneously in speeding up production of fiber-glass laminates. The gun will deposit up to 15 lb of high-strength laminate per minute and is designed for one-man operation. The unit consists of a roving cutter combined with two resin spray guns mounted together on a single hand-held frame. One spray head carries plastic and accelerator, the other plastic and catalyst. Three streams, two of resin, and one of fiber-glass, meet outside the gun in midair allowing laminate to be deposited with minimum of trapped air. It weighs 9 lb and will deposit resin and fiber on any conventional mold construction or surface.—Made by **Rand Development Corp.**, 13600 Deise, Cleveland 10, Ohio.

For More Details Circle No. 407—Page 192

COUNTING DEVICE

Automatic counting device is designed for any operation controlled by hydraulic action. No linkage or solenoids need assembly as the counters require only screwing into the line controlling the hydraulic cylinder. The five-digit hydraulic action counter registers up to 300 counts per minute. Either knob or tamperproof key reset models are available with hydraulic units 50 to 8000 psi. Snap-on attachments are available so individual operators can turn in counters at shift changes for tabulation. Machines can be set so that absence of a counter will make them inoperative.—Made by **Pneumaticount**, 3400 North East 54th Ave., Portland, Oreg.

For More Details Circle No. 408—Page 192

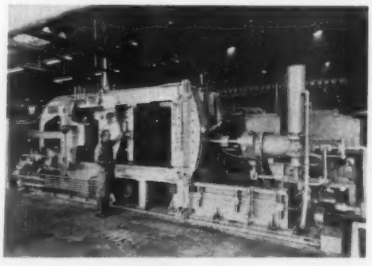
WIRE CONTAINERS

Model 125 heavy-duty Cargotainer has been designed as a rigid container for handling heavy castings, among other applications. Size of the container is 53 in. long x 48 in. wide x 38 in. high. Length and width are outside dimensions and the capacity is 6000 lb. It affords visual inventory and cleanliness by use of heavy wire mesh. Base construction is of channel ⅛ x 6⅛ in., with angle supports 2 x 2 x ¼ in. The wire mesh is 2 gage x 2/0 gage and features 2 x 2 in. openings. Corner posts are formed channel 3/16 x 5 11/16 in., with positive locking type legs. Runner type supports permit sliding container without damage to legs.—Made by **Tri-State Engineering Co.**, Washington, Pa.

For More Details Circle No. 409—Page 192

DIECASTING MACHINE

Diecasting machine of 1200 tons capacity is capable of casting up to 47½ lb of aluminum. Machine is said to be the largest ever built to employ the unit frame principle. A one-piece cast alloy steel frame holds a movable die plate 55 in. high x 72 in. wide and can accommodate a



maximum die height of 50 in. Toggle locking mechanism allows a die opening adjustable from 10¼ to 36 in. Maximum shot pressure available on the machine is 20,300 psi. Prefill plunger stroke is 25 in. Die height adjustment is accomplished by an electric motor mounted on the frame. Other features are a prefill injection system, adjustable shot position, automatic grease lubricating system, and automatic hydraulic ejection.—Made by **Lester-Phoenix Inc.**, Dept. N-14, 2711 Church Ave., Cleveland 13, Ohio.

For More Details Circle No. 410—Page 192

LITERATURE

Combustion Units

Catalog T-1067 describes high frequency induction units and accessories for high temperature combustion of laboratory samples. Units for analysis of carbon, sulfur, and hydrogen in cast iron, carbon steels, alloys, titanium, coal, and coke are included.—**Lindberg Engineering Co.**, Laboratory Equipment Division, 2444 West Hubbard St., Chicago 12, Ill.

For More Details Circle No. 411—Page 192

Foundry Flasks

Specifications, construction features, and engineering data on flasks, bottom boards, squeeze plates, upsets, core plates, pins, bushings, lugs, and clamps are covered in Catalog G.—**American Foundry Flask Co.**, 2745 Southwest Blvd., Kansas City, Mo.

For More Details Circle No. 412—Page 192

Mounted Wheels

Specification recommendations and general information regarding grinding action, wheel markings, grade, bond types, abrasive types, structure, grain size, spindles, and treatments of mounted wheels are provided in catalog.—**Bay State Abrasive Products Co.**, Westboro, Mass.

For More Details Circle No. 413—Page 192

Corrosion Resistance

Revised edition of "Corrosion Resistance of Copper and Copper Alloys," covers continuous laboratory research and field study on corrosive attack of these metals when in contact with 186 different corroding agents.—**American Brass Co.**, Box 1939, Waterbury 20, Conn.

For More Details Circle No. 414—Page 192

Gravity Conveyors

Installation photographs, blueprints, descriptions and general data on gravity roller conveying systems are highlighted in folder.—**Alvey-Ferguson Co.**, 2028 Disney St., Cincinnati 9, Ohio.

For More Details Circle No. 415—Page 192

Tooling Material

Brochure presents several case studies and other application data on Epoxy-Alloy, a metal-fiber-reinforced epoxy composition that

For Foundrymen

extends the benefits of plastic tooling materials.—**Bakelite Co.**, a division of Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 416—Page 192

Vacuum Pumps

Design and construction features, and physical and operating specifications of high vacuum diffusion and booster diffusion pumps are presented in bulletin.—**NRC Equipment Corp.**, a subsidiary of National Research Corp., 160 Charlemont St., Newton Highlands 61, Mass.

For More Details Circle No. 417—Page 192

Portable Potentiometer

Features, calibrations, condensed specifications, and applications of Thermotest portable potentiometer for measuring temperatures and voltages are covered in Bulletin T-57.—**Technique Associates Inc.**, Box 91, Indianapolis 6, Ind.

For More Details Circle No. 418—Page 192

Lift Truck Maintenance

Preventive Maintenance Manual offers a 32-point checklist to provide lift truck owners and operators tips on the care and servicing of material handling equipment.—**Towmotor Corp.**, Cleveland 10, Ohio.

For More Details Circle No. 419—Page 192

Industrial Heater

Construction, application, and performance features of the Herman Nelson industrial heater are detailed in Bulletin 750A. The unit can be used for make-up air or for plant heat load.—**American Air Filter Co.**, Dept. PD, 215 Central Ave., Louisville 8, Ky.

For More Details Circle No. 420—Page 192

Air Hose Couplings

Revised Catalog H-52 presents general information, typical applications, advantages, and specifications of industrial vinyl hose and company's H-52 Quik-Koupler fitting. The fitting is suitable for rubber or composition hose also and is interchangeable with most major coupling lines.—**Hofmann Engineering Co.**, 5601 S. Crawford Ave., Chicago 29, Ill.

For More Details Circle No. 421—Page 192

ACETYLENE GENERATOR

Oxweld MP-11 acetylene generator with carbide capacity of 500 lb will produce 1000 cu ft of medium-pressure acetylene per hour. An automatic signal system consisting of a howler and indicator lights provides both audible and visual warning if minimum carbide supply, water level, or water temperature should deviate from normal. With standard regulating equipment the generator can be used to supply low-pressure acetylene to a piping system. Each generator is equipped with an automatic carbide and water shutoff system, a hydraulic back-pressure valve, and pressure relief valves.—Made by **Linde Co.**, division of Union Carbide Corp., 420 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 422—Page 192

MULTIFINGERED VISE

Multifingered vise automatically adapts its grip to provide positive holding of irregular-shaped pieces. The vise can be used substantially the same as conventional vises for holding rectangular-shaped objects but is able to adjust its gripping fingers to conform to objects of any shape. The vise has many applications in fixturing work. A number of vises can be mounted together on the bed of a grinder, milling machine, planer, or similar machine to afford easy positioning of a number of odd-shaped pieces, and can be used as a lathe chuck. It is adaptable to automation lines, with positioning, closing, and holding all done automatically. A number of sizes, with jaw faces measuring from 1 9/16 to 6¼ in., are available.—Made by **E. W. Bliss Co.**, Die Supply Division, 1400 Brookpark Rd., Cleveland 9, Ohio.

For More Details Circle No. 423—Page 192

FIRE EXTINGUISHER

Dry powder fire extinguisher with 3-lb capacity weighs 8 lb fully charged and is pressurized with 130 psi nitrogen. Its one-piece spun steel cylinder meets ICC standards and is hydrostatically tested for 800 lb with a rupture point of 3000 lb. All working parts are brass or bronze. Propane, butane, and other gas fires reportedly can be extinguished with

Device Weighs Conveyed Material in Motion

WEIGHING DEVICE is designed for weighing any small lump, granular, or flaky dry bulk material while the material is in motion. Material to be weighed enters and leaves the weigher at points which are in close proximity. These points are in line with the pivot axis of the weigher to eliminate weight errors due to dropping of material and depth of stream. The unit can be completely enclosed, dust-tight, and gas-tight if desired.

The weigher will indicate material flow rate at any moment in pounds per minute or per hour, or tons per hour. It will provide a chart record of flow rate for 24-hr periods, and will record total weight from starting time to any given moment. The unit can be used in connection with any type of conveyoring equipment. Minimum headroom is required. Made by **Stephens-Adamson Co.**, Aurora, Ill.

For More Details Circle No. 463—Page 192

this unit. The unit has an effective range of 10 to 12 ft and the powder cloud insulates the operator against heat and flame.—Made by **Safety First Products Corp.**, Elmsford, N. Y.

For More Details Circle No. 424—Page 192

AIR-GAS MIXER

Series 20 Unimix machines are for manual or automatic mixing of air and gas on furnaces, boilers, ovens, air heaters, washers, and dryers. The

machines provide a single, centralized control of combustion characteristics wherever premixed air/gas is required. An air filter can be added at inlet to the mixer where required by severe dirt conditions. Almost all types of blast burner equipment can be used with the Unimix machine. Standard models deliver air/gas mixtures for 800,000 to 2,350,000 Btu maximum burner input and 215,000 to 500,000 Btu minimum burner input. Made by **Industrial Combustion Division, Eclipse Fuel Engineering Co.**, Rockford, Ill.

For More Details Circle No. 425—Page 192

CASTING EPOXY RESIN

Hysol HF 1385 casting epoxy resin has been developed especially for making core driers for use in dielectric ovens. The material was developed, according to the manufacturer, as an answer to a need in the foundry industry for an easy-to-cast and easy-to-use core drier.—Made by **Houghton Laboratories Inc.**, Olean, N. Y.

For More Details Circle No. 426—Page 192

HANGER ASSEMBLIES

Hanger bearing assemblies for industrial conveyor rolls are engineered for use in high-temperature equipment as dryer and oven conveyors. Each assembly has a Graphalloy bushing, a composition that is a dry lubricant capable of retaining its properties over a wide range of temperatures (minus 450° F to 750° F). The bushings reportedly do not attract dirt or lint and do not swell or change dimension. Wide selection of models for various types of mountings is available. All models have a quick-release feature to enable reversing of the bushing.—Made by **Graphite Metallizing Corp.**, 1050 Nepperhan Ave., Yonkers, N. Y.

For More Details Circle No. 427—Page 192

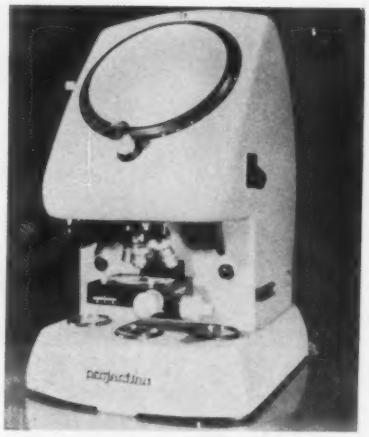
TEMPERATURE CONTROL

Mercury-actuated indicating temperature control said to be accurate within one-half per cent of scale range will sense, indicate, and control processes and appliances within ranges of minus 30° F to 1100° F. Ten different scale ranges are offered. Applications include all types of process operations, industrial ovens, furnaces, kilns, and dryers. An improved readability feature has been designed into the instrument to refine accuracy in setting and reading and minimize possibility of human error.—Made by **Partlow Corp.**, 505 Campion Rd., New Hartford, N. Y.

For More Details Circle No. 428—Page 192

PROJECTING MICROSCOPE

Projectina, a Swiss optical precision unit, combines into a portable housing a microscope, projector, comparator, and camera to facilitate research and laboratory work in industrial applications. By fitting an adapter to the observation face of the instrument, any image previously projected on the screen in the magnification range 7x to 2000x may be photorecorded in black and white or



color. Micro pictures may be seen on a 7-in. ground glass screen and also through the eye piece, at a constant scale, without refocusing. Built-in illuminators allow for microscopy and projection in transmitted bright and dark field as well as surface bright and dark field. Imported by **Alfred Hofmann & Co.**, 629-635 Fifty-Ninth St., West New York, N. J.

For More Details Circle No. 429—Page 192

LITERATURE

High Temperature Alloys

Physical properties, short-time tensile data, stress rupture and creep data on Haynes Alloy No. 25 and Hastelloy Alloy X are highlighted in two bulletins. Alloy 25 is a wrought cobalt-base high temperature alloy and Hastelloy Alloy X is a nickel-base high temperature alloy available in both wrought and cast form.—**Haynes Stellite Co.**, a division of Union Carbide Corp., 30-20 Thomson Ave., Long Island City 1, N. Y.

For More Details Circle No. 430—Page 192

Special Refractories

Bulletin 324, "A Guide to the Selection of Taylor-Made Special Refractories," gives detailed information on castables, cements, ramming mixes, and patches.—**Chas. Taylor Sons Co.**, subsidary of National Lead Co., Box 58, Annex Sta., Cincinnati 14, Ohio.

For More Details Circle No. 431—Page 192

Hand Lift Trucks

Brochure, "Mechanical and Hydraulic Hand Lift Trucks," answers four questions—what they are, how they operate, how to select, and how to use.—**Association of Lift Truck and Portable Elevator Manufacturers**, Suite 759, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 432—Page 192

Steel Flooring

Five different types of steel for floors, stairs, steps, ramps, catwalks, and platforms are described in Bulletin 50-9. Both solid and open types are covered.—**Joseph T. Ryerson & Son Inc.**, Box 8000-A, Chicago 80, Ill.

For More Details Circle No. 433—Page 192

Blast Cleaning Machines

Catalog 951-D covers line of airless blast cleaning machines as well as wet blast, air blast, and dust control equipment. Cast steel shot, grit abrasives, sandcutters, and core rod straighteners also are highlighted.—**Wheelabrator Corp.**, 1102 South Byrkit St., Mishawaka, Ind.

For More Details Circle No. 434—Page 192

Metal Putty

Bulletin F-1 describes applications for an epoxy-based compound metal putty for filling blow-

For Foundrymen

holes in castings, eliminating sand pits, small gas holes, shrinkage cracks, or porous areas.—**Carl H. Biggs Co.**, 2255 Barry Ave., West Los Angeles 64, Calif.

For More Details Circle No. 435—Page 192

Material Handling

Illustrations, application drawings, tables, diagrams, engineering, and technical information on material handling devices are offered in Catalog C-1.—**Merrill Brothers**, Caspian St., Maspeth, N. Y.

For More Details Circle No. 436—Page 192

Industrial Cars

Design and construction features, application photographs, and general information on custom built industrial cars, trailers, and turntables are found in Catalog C.—**Easton Car & Construction Co.**, Easton, Pa.

For More Details Circle No. 437—Page 192

Airless Blast Machine

December, 1957, issue, *Pangborn News*, highlights engineering features of 72-cu-ft Rotoblast batch cleaning barrel designed to handle castings that weigh as much as one ton.—**Pangborn Corp.**, 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 438—Page 192

Compressed Air Dryers

Bulletin describes new models of heatless, self-activating, zero dewpoint dryers designed to prevent moisture fouling of molds, instruments, testers, circuits, and gases. —**Van Products Co.**, 5738 Swanville Rd., Erie, Pa.

For More Details Circle No. 439—Page 192

Overhead Handling

Basic standard equipment used in company's monorail installations is pictured and described in Catalog SC-2.—**American Monorail Co.**, 13107 Athens Ave., Cleveland 7, Ohio.

For More Details Circle No. 440—Page 192

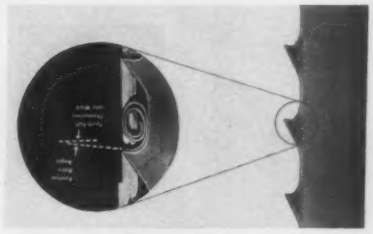
Induction Heaters

Construction and design features of Allis-Chalmers high frequency induction heaters and induction melting furnaces are described in Bulletin 12B6430B. — **Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.

For More Details Circle No. 441—Page 192

CLAW TOOTH SAW BANDS

Saw band design is characterized by a forward slanting tooth face which evolves into an elliptical gullet for distribution of stresses. The positive rake is based on the same chip generation geometry successful for lathe tools and milling cutters. Made of hard edge, disposable carbon steel, the saw bands are available for cutting moderately tough ferrous metals and a wide range of nonferrous metals. Six widths (¼, ½, ¾, 1, 1½ and 2 in.) and four pitches are available. Made by **DoAll Co.**, 254 North Laurel Ave., Des Plaines, Ill.



For More Details Circle No. 442—Page 192

GAS GENERATORS

Exothermic gas generators produce inert gas by burning fuel gas under controlled conditions. Output capacities of standard models range from 500 to 25,000 cfh with larger models available. The generators use a fire-brick-lined, water-jacketed combustion chamber in which the product gas is produced. The generators are completely automatic and are equipped with necessary safety and control devices for safe, accurate operation. The generators can be installed in any plant having fuel, water, and electricity of these capacities based on needs for each 1000 cfh of capacity: Fuel, 110 cfh based on 1000 Btu gas; electric power, 1 kw hr/hr; water, 275 gph at 30 psi and minimum temperature 75° F.—Made by **A. A. Straub Co.**, 4930 Grayton Rd., Cleveland, Ohio.

For More Details Circle No. 443—Page 192

INSPECTION KIT

Portable fluorescent penetrant inspection kit for locating cracks, pores, leaks, and other defects open to the surface in any solid material, features pressurized spray cans of cleaner, penetrant, and developer; high-intensity black light; cleaning cloths, and detailed instructions.—Made by **Magnaflux Corp.**, 7300 West Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 444—Page 192

HYDRAULIC PRESSES

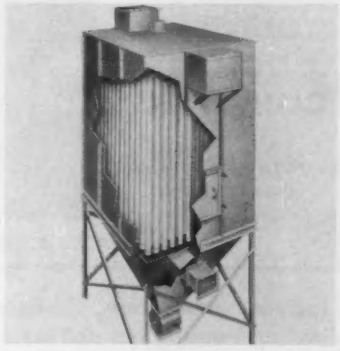
Heavy-duty hydraulic trim presses are designed around an accumulator with a closed shock-free, pressurized, hydraulic system to achieve rapid cycling action with reduced horse-

Glass Bags Filter "Hard To Collect" Dusts

GLASS-BAG FILTER for collecting hot, corrosive industrial dusts and fumes is engineered for applications where "hard-to-collect" dusts have been among industry's worst air pollution offenders. The photograph shows the internal design of the filter. Bags made of glass cloth are single hung, tubular type. Remote controlled air valves permit opening and closing of inlet and outlet during shaking.

The filter is able to operate at temperatures to 600° F and resists deterioration from all substances except fluorine and hydrofluoric acid. The fiber glass cloth in the tubes has been treated for protection against fracture, and the spacing between bags prevents bag contact during shaking. Bag suspension and shaking mechanisms are designed to assure correct bag hanging tension, minimum wearing action, and gentle, effecting shaking.

Air cleaning action is similar as

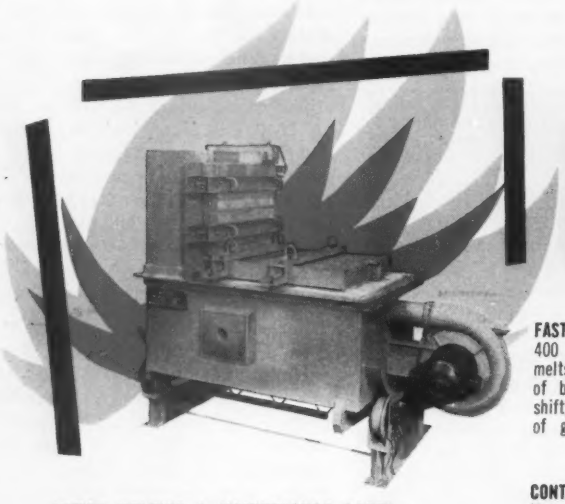


in conventional filter designs. Dust and fume-laden air is drawn into the filter hopper and upward into the bags. The cloth traps practically all particles so that clean air, 99½ to 100 per cent free from visible dust, passes through. Periodic shaking loosens the particles, which fall to the bottom of the hopper to be discharged. Made by **Dracco Corp.**, 4063 East 116th St., Cleveland 5, Ohio.

For More Details Circle No. 564—Page 192

SAVE $ WITH REDA FURNACES

FUEL SAVINGS UP TO 50% REPORTED
USING REDA GAS-OIL FIRED FURNACES!



BEST HEAT EFFICIENCY

FASTER MELTING — One 400 series Reda Furnace melts up to 11,000 lbs. of brass or bronze per shift, and up to 6,000 lbs. of gray iron per shift.

CONTINUOUS POURING — No waiting until floors, flasks, boards, etc. are filled with molds!

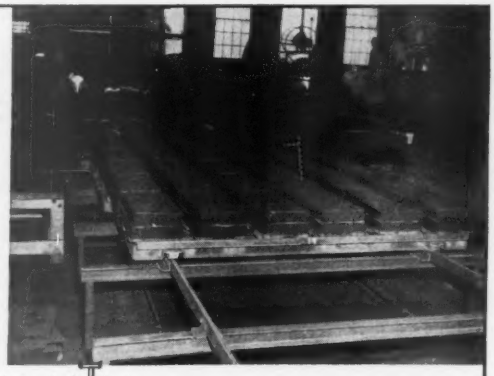
LOWER MELTING & MAINTENANCE COSTS — One man can operate a Reda Furnace . . . No daily repairs needed!

FURNACE DIVISION WRITE TODAY FOR DESCRIPTIVE BULLETIN
REDA PUMP COMPANY - BARTLESVILLE, OKLAHOMA

Circle 672 on Page 51

HANDLE MORE MOLDS PER DAY using NOMAD CONVEYORS

SMOOTH MOLD TRAVEL GUARANTEED!



Increase production! Reduce back-breaking labor by eliminating running out and laying down molds. Reduce shifts in molds and save scrap because of a patented Nomad feature on all roller-equipped bottom boards and pallets. Save valuable floor space with the right track style for your operation. Get all these benefits with Nomad. IT'S LOW COST MODERNIZATION! *Write for information.*

Switches, turntables, transfer cars, mold dumps and pallet raisers can add even more productivity.

NOMAD FOUNDRY EQUIPMENT

NOMAD EQUIPMENT DIVISION
WESTOVER CORPORATION
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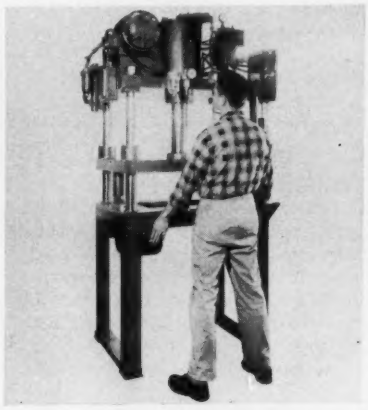
power input. Either two or four-post types in 13, 20, 30, 40, and 50-ton capacities are available. Platen sizes of 15 x 18 up to 36 x 54 in., offering 12, 15, and 18-in. strokes, with shut-



heights of 5, 10, and 15 in. are available. A control selector provides a selection of manual, semiautomatic, and setup cycling. Typical applications include swaging, trimming, forming, drawing, and shearing. Made by **Arthur E. Bausenbach,** 75 Meadow Rd., Buffalo 16, N. Y.

For More Details Circle No. 445—Page 192

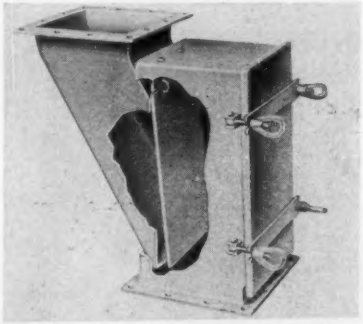
STATIONARY COMPRESSORS

Industrial stationary compressors in 20 to 125-hp sizes, operating at 125 psi, are lightweight, compact, and do not require special foundations or separate rooms. Both air-cooled and water-cooled models are offered. The Hydrovane rotary compressors are completely enclosed—no belts or couplings are exposed.—Made by **Davey Compressor Co.,** Kent, Ohio.

For More Details Circle No. 446—Page 192

TRICKLE VALVE

Type FA trickle valve provides continuous discharge of dust from cyclones and other dry dust collectors while maintaining a positive gas seal.



A front access door allows access to internal parts for inspection. The valve is suitable for all free-flowing materials with a specific gravity of 2 or higher. It is applicable for

3 IMPORTANT REASONS WHY STEINEX IS YOUR BEST BUY IN BINDER!

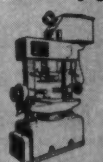
1 YOU GET THE *BEST SHAKEOUT!*

2 YOU GET THE *BEST BINDER . . .* FOR THE *LOWEST COST . . . BY FAR!*

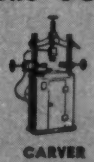
3 YOU GET *CARVER SERVICE . . .* A BIG PLUS VALUE!

When you buy Steinex, you get Carver experience and in-the-foundry know-how that will *show* you how to use STEINEX in your CO_2 operation successfully . . . and profitably!

Only Carver Has Everything For the CO_2 Process!



CARVER V & S Core Shooters



CARVER Automatic Gassing Apparatus

KRAUSS Core Vents

CARVER Rapid Mullers

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CARVER FOUNDRY PRODUCTS CO.,
Muscatine, Iowa

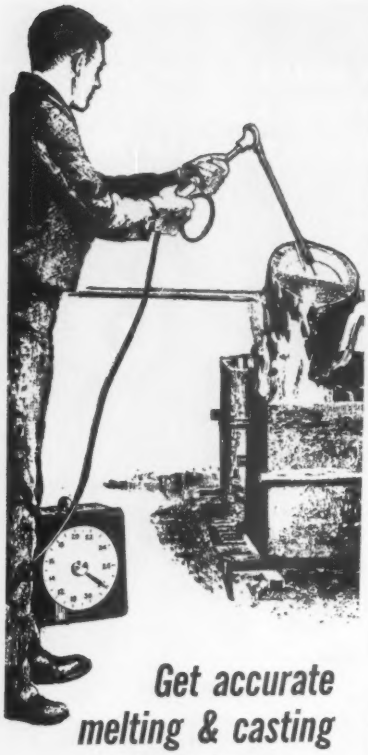
RUSH information and prices on STEINEX binders.

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

Circle 674 on Page 51



Get accurate melting & casting temperatures . . .
IN SECONDS!

Now, in 10 seconds or less, you can get precise molten metal temperature measurements in induction furnaces, pot furnaces, ladles, risers, test spoons, runner boxes, troughs, lab furnaces . . . anywhere in the shop.

The operator simply dips the platinum tip of the L&N Portable Thermocouple—protected by its expendable, low-cost quartz sheath — into the molten metal. In seconds, he sees true temperature boldly indicated on the 23-inch circular scale of the portable, a-c operated Speedomax H potentiometer indicator.

Simple to use, economical to maintain, this equipment has been enthusiastically received in hundreds of foundries and melt shops. It's available as a complete "package"—with an indicator range of 1000 to 3000 F, or 2000 to 3200 F, as specified—ready for immediate use.

A call to your nearby L&N Field Office will bring full information . . . or write for Data Sheet N-33A-681(3) to Leeds & Northrup Company, 4917 Stenton Avenue, Philadelphia 44, Pa.

LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces

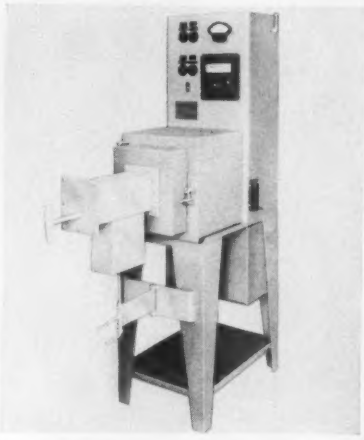
Circle 675 on Page 51

negative pressures up to 12 in. water gage. Made by **Ducon Co.**, 147 East Second St., Mineola, N. Y.

For More Details Circle No. 447—Page 192

ATMOSPHERE FURNACES

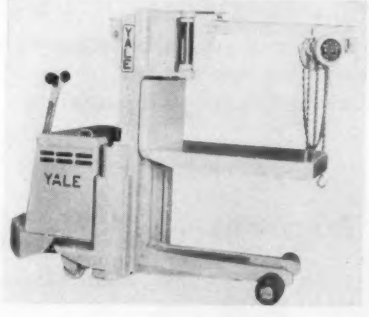
Atmo-Carb controlled atmosphere electric furnaces have a temperature range to 2000° F and feature elements of Kanthal supported in Dyna-Glow holders for simplified element replacement. An atmosphere generator uses alcohol as one of the atmosphere generating liquids. The atmosphere is useful for clean hardening, carburizing, and preventing decarburization of straight or chrome nickel steels. It may be used also for case hardening low carbon steels. Six standard models are available. Special size units can be made. Made by **L & L Mfg. Co.**, 136 Eighth St., Upland, Del. Co., Pa.



For More Details Circle No. 448—Page 192

LIFT TRUCK ATTACHMENT

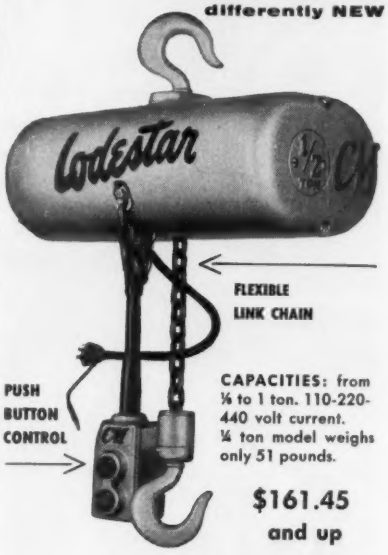
Attachment for company's Worksaver rider-walkie lift truck integrates the unit with conveyor lines carrying bulky, fragile materials such as flasks. The unit is a high lift platform truck equipped with a swinging boom to which a ½-ton capacity spur gear trolley type hoist has been added. The boom slews through 180 degrees, permitting positioning of the hoist over a conveyor line on either



FOR HEAVY DUTY FOUNDRY SERVICE AT A SURPRISINGLY LOW PRICE . . .

Lodestar®

ENTIRELY NEW
differently NEW



CAPACITIES: from ⅛ to 1 ton. 110-220-440 volt current. ¼ ton model weighs only 51 pounds.

$161.45 and up

. . . THE FIRST TRULY "HEAVY DUTY" VERSION OF THE SMALL ELECTRIC HOIST

Featuring:

- Push Button Control
- Self-Adjusting Heavy Duty Brake
- Sealed-in Lifetime Lubrication
- Overload Protection
- Fully Enclosed Components
- Lowest Headroom
- "CM-Alloy" Flexible Link Chain

WRITE US
or call your CM distributor for literature, prices and quick delivery from stock.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
Columbus-McKinnon Chain Corporation
Tonawanda, New York
Regional Offices: New York • Chicago • Cleveland
In Canada:
McKinnon Columbus Chain Ltd., St. Catharines, Ont.

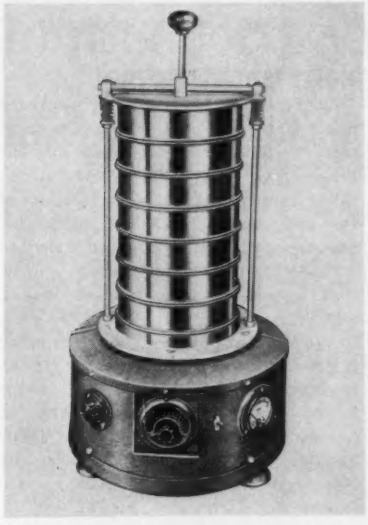
Circle 676 on Page 51

side of the truck to transfer material from the line to the truck's platform, or from truck to line. Because of the 90-degree angle side loading, the capacity of the boom is restricted to 750 lb. Made by **Yale & Towne Mfg. Co.**, 11,000 Roosevelt Blvd., Philadelphia 15, Pa.

For More Details Circle No. 449—Page 192

TEST SIEVE SHAKER

Vibrating test sieve shaker features an electromagnetic drive to give rapid gradation and a rheostat-voltmeter combination that enables the user to



operate the unit at a constant 90 volts to maintain identical conditions for accurate comparison tests. Adjustable feet and spirit level on the base rim give perfect leveling. A reset timer controls time test periods accurately. The shaker will hold six standard 8-in. sieves and bottom pan. A range of coarse and fine sieves in U. S. and Tyler equivalents is available. Made by **Syntron Co.**, 540 Lexington Ave., Homer City, Pa.

For More Details Circle No. 450—Page 192

TRACTOR-LOADER

Four-wheel-drive, rear-wheel-steer tractor-loader of the 1¾-cu-yd class features short, rigid lift arms, pivoted forward of the operator's position. This, together with a low center of gravity and wide wheel tread, is said to give the unit exceptional side stability and long forward reach in all positions. Forward reach at 7 ft dump height is 62½ in. Over-all length is 18 ft, 5 in. With bucket at carry position, it weighs about 15,680 lb and turns within an outside radius of 21 ft, 11 in. Three interchangeable buckets are available—a 1⅜ cu yd (heaped) heavy duty; a 1¾ cu yd standard material, and a 2¾ cu yd light material bucket are

On the right track to a quality melt at lower cost?

Even the bravest learn how to hot-foot it away under pressure...disguising the trail enroute. But while Junior and Chief Keokuk are tethered to the tootsie tracks, old brother bear tiptoes away with the Princess!

POOR QUALITY LEAVES A COSTLY TRACK that can't be covered. Be on the right path from the start . . . always use Keokuk Silvery Pig Iron, the superior form of silicon introduction that distributes evenly in every melt! Handle by magnet, furnace-charge by weight, or count the pigs for equal accuracy. Aluminum producers, there's no substitute for Keokuk Silicon metal.

Keokuk Electro-Metals Company, Keokuk, Iowa; Wenatchee Division, Wenatchee, Washington.

KEOKUK SILVERY PIG IRON
SILICON METAL—OTHER FERROALLOYS

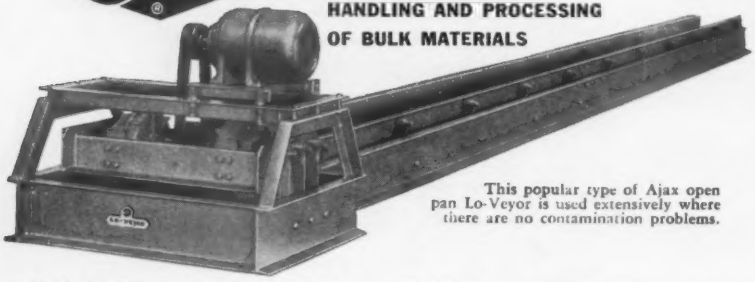
When you think of SILICON, think of KEOKUK!

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Keokuk Silvery Pig—the superior form of silicon introduction—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

AJAX LO-VEYORS

FOR MULTI-PURPOSE HANDLING AND PROCESSING OF BULK MATERIALS



This popular type of Ajax open pan Lo-Veyor is used extensively where there are no contamination problems.

AJAX Lo-Veyors are made in lengths from 3 feet up. They are available in open pan or booted cover types to safeguard critical processes or formulas against contamination. Conveyor pans can be arranged for simultaneous screening, washing, drying, cooling and other operations. Stringy, elongated, abrasive, fine or course mesh materials never hang up while being conveyed in Ajax Vibrating Lo-Veyors. The positive upward and forward tossing action keeps materials flowing freely and evenly.

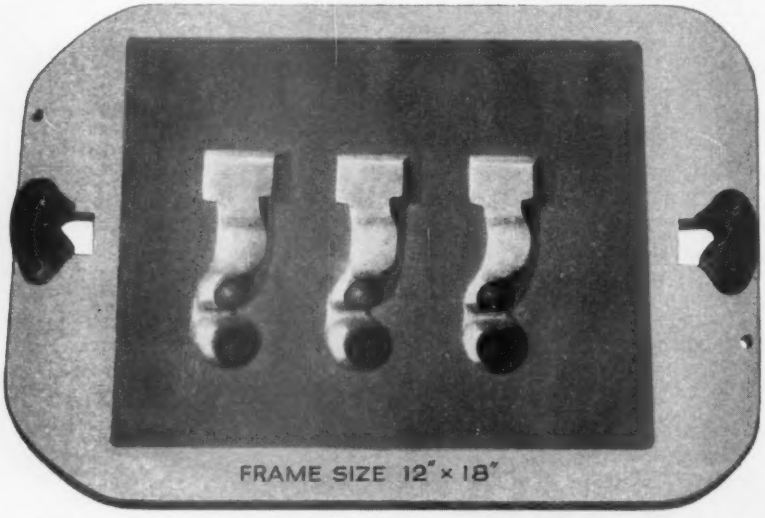
Tubular type Ajax Lo-Veyors provide sealed, gas tight operation in closed systems under vacuum or pressure. Diaphragm seals can be used where tube passes through walls of processing plants.

Ajax Vibrating Lo-Veyors are self-contained, require little head room for drive and pan, are easily and quickly installed on or below floor levels or suspended from walls or ceilings. Made in a wide range of sizes and lengths, they are being used from beginning to end in progressive processing.

Write for Bulletin 39

AJAX FLEXIBLE COUPLING CO. INC.
WESTFIELD, N. Y.

Circle 678 on Page 51



"The type of work we produce in TAMASTONE we would be unable to make at all in the absence of skilled help!"

COLUMBUS BRASS & ALUMINUM CO., INC., Columbus, Indiana

This Drier equipment pattern is for a port core box on a diesel engine and is made from an original master pattern. *Only one shrinkage!* Material is aluminum. Pattern was used for 100 Driers. Only 2 hours labor and 20 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

TAMMS INDUSTRIES CO., 228 N. LaSalle St., Chicago 1, Ill.

available. Power shift and steer, Torqmatic drive, speeds to 21 mph in forward and reverse, and color-

coded instruments for safer operation are other features.—Made by **J. I. Case Co.**, Racine, Wis.

For More Details Circle No. 451—Page 192

HOIST MOTOR CONTROL

Control for alternating current hoist motors uses full magnetic control combined with an eddy current brake. All control electrical components are standard. Excitation of the eddy current brake is controlled automatically by the motor speed to provide smooth acceleration. For fast acceleration, a master switch may be moved to eliminate eddy brake excitation. Off-point braking is provided to assist the motor brake in stopping the load. The motor brake is applied automatically in lowering if the eddy current brake should be interrupted.—Made by **Northern Engineering Works,** 210 Chene St., Detroit 7, Mich.

For More Details Circle No. 452—Page 192

TESTING MACHINE

Mark G Servomatic testing machine of 10,000-lb capacity is designed so that the center of test always remains at the same point regardless of length of specimen or amount of extension. Employing two moving crossheads actuated by ball and screw

mechanisms, the machine achieves a motionless center of test by making the two crossheads pull against each other or compress toward each other. The force measuring system is incorporated in the crosshead. Four SR-4 load columns in the upper cross-

***Progress** in plan-it-yourself air systems:*

You can use Schrader Air Products to produce faster at a lower cost

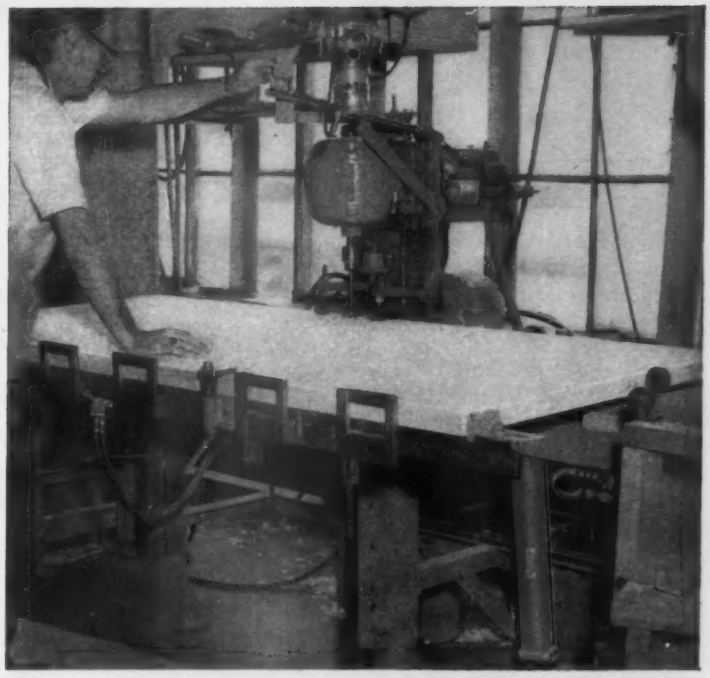
Air is a *natural* for many operations in processing, handling and other multi-step production . . . even to mortising doors in the woodworking field. Every day air's speed, simplicity and safety are effecting new production records.

Here's an example:

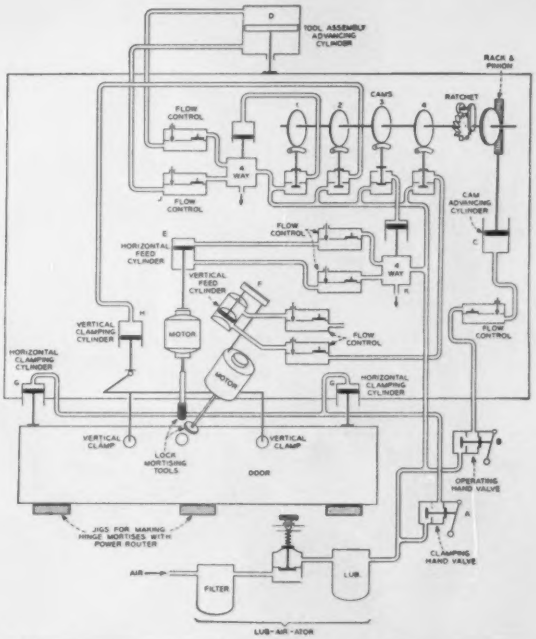
At a prominent Western woodworking company, Schrader Air Products are used on the door-mortising machine to clamp work in place, advance programming cam, and actuate all tool feeds. The machines work with extreme precision and the speed and economy of the operation are spectacular.

Chances are that Schrader Air Products can do the same for you no matter *what* you do. Take advantage of Schrader engineering facilities, available upon request, to assist you in planning for the best use of air in your production, and selection of the *right* Schrader Products to fit your needs.

Information is available by writing directly to us . . . and our Distributors are conveniently located for fast delivery.



A revolutionary building trend—pre-hung doors—means tremendous savings. Doors and frames are mortised for lock sets and hinges, assembled. This schematic shows how the door is prepared.



Schrader
a division of SCOVILL

QUALITY AIR CONTROL PRODUCTS

A. SCHRADER'S SON • Division of Scovill Mfg. Co., Inc.
465 Vanderbilt Avenue, Brooklyn 38, N. Y.

Please send latest informative booklets which show Schrader's complete line of products.

Name_____ Title_____

Company_____

Address_____

Circle 664 on Page 51

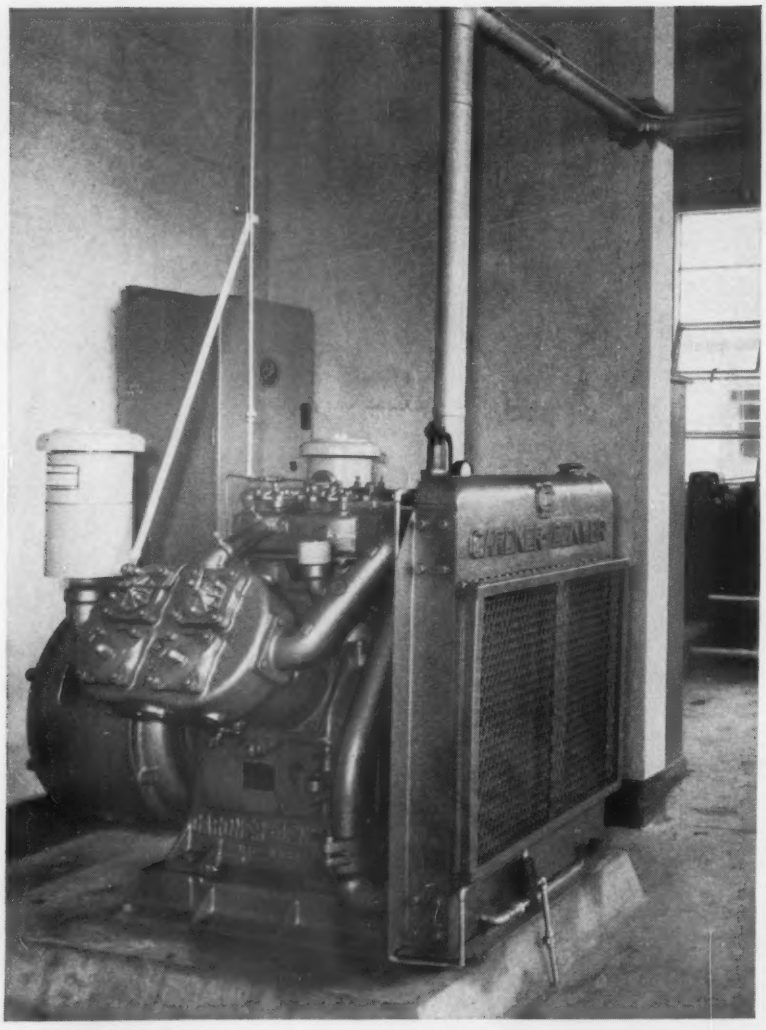
GARDNER DENVER

Compact and efficient, the Gardner-Denver WB supplies low-cost compressed air power from a small corner of your plant. The "W" design saves floor space. Balanced high- and low-pressure cylinders eliminate vibration and the need for expensive foundation. Pump circulates cooling water around cylinders and separate valve chambers. That's the story of WB quality. Want details? Send for Bulletin WB-10.

Stationary air compressors . . . tank-mounted compressor outfits . . . oil-free air compressors . . . whatever your compressed air needs, see your Gardner-Denver compressor specialist first. Gardner-Denver Company, Quincy, Illinois.

Compact . . . efficient

WB Two-Stage Compressor



head do the measuring. A ¾-hp motor gives a test movement of 20 ipm. Models in sizes up to 300,000-lb capacity can be supplied. Made by **Electronics & Instrumentation Division, Baldwin-Lima-Hamilton Corp.**, Waltham, Mass.

For More Details Circle No. 453—Page 192

FACE SHIELD

Face shield of translucent fiberglass material combines light weight and strong, tough wearing qualities. The shield, No. 438-TF, employs the company's G1-R headgear for quick

and easy fitting. It is easily tilted up off the face. Made by **Chicago Eye Shield Co.**, 2300 Warren Blvd., Chicago 21, Ill.

For More Details Circle No. 454—Page 192

BENCH TYPE FURNACES

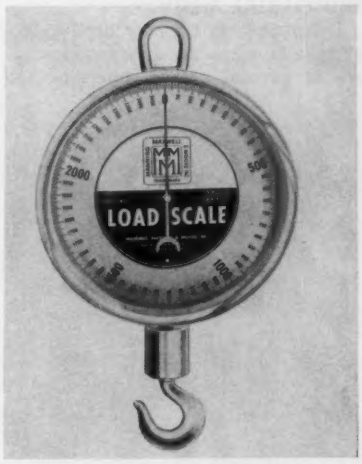
Four electric bench type furnaces have chamber sizes that are 22 in. deep x 10 in. wide x 9½ in. high. Over-all dimensions are 37¾ in. long x 27¼ in. high x 24 in. wide. Each furnace is cased in a 16-gage steel shell and has 7½ in. of firebrick and backup insulation surrounding the heating chamber. Furnaces are fitted with close-sealing double doors. If limited access to the chamber is desired, the lower section alone can be fully or partially opened. Power to the heating elements is cut off automatically when the door begins to open. Units are available with or without controls. Automatic, package controls can be supplied.—Made by **Thermo Electric Mfg. Co.**, Dubuque, Iowa.

For More Details Circle No. 455—Page 192

LOAD SCALES

Precision load scales permit weighing and handling in one operation and are said to be accurate within 0.2 of 1 per cent of the full scale

reading. The mechanism is sensitive to weight changes of less than one-half of one division. The scale illustrated weighs 42 lb and is built to withstand rough usage in below-the-hook applications. It is unaffected



by heat or cold within normal temperature ranges.—Made by **Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division,** Muskegon, Mich.

For More Details Circle No. 456—Page 192

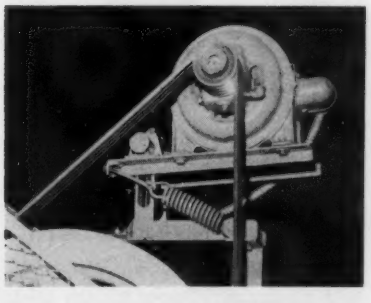
WELDING SHIELDS

Selfsupporting, portable welding shields are designed to confine the welding operation and protect surrounding personnel from sparks, flash, flying chips, and scale. The shields are made of flameproofed canvas over a wire mesh frame and can be used for floor, bench, machine, and overhead welding, or flame cutting, wire brushing, chipping, and grinding operations—Made by **Industrial Products Co.,** 2827 North Fourth St., Philadelphia 33, Pa.

For More Details Circle No. 457—Page 192

MOTOR BASE

Tens-A-Matic spring-loaded, pivoted motor base provides automatic belt stretch take-up and automatic ten-



sion control to prevent belt slip as well as bearing and belt overloads. Bases through 30 hp in the spring-

Coat castings fast

with safe, sure air lift

This foundry has found a safe, sure way of getting heavy castings in and out of a spray booth—the Keller 86-2V20, one-ton air hoist. Paint spray doesn't affect hoist operation. Non-sparking air motor makes hoist safe for spray booth location. The 86-2V20 provides a variable-speed lift . . . gentle starts and accurate stops to keep job moving along.

Keller air hoists in capacities from 150 lb. to 2 tons. Write for Bulletin 80.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER Since 1859 — KELLER TOOLS

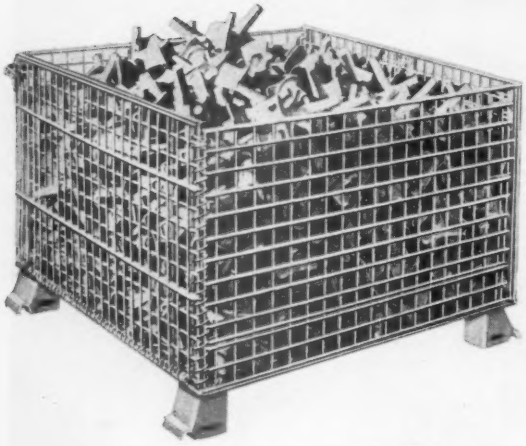
GARDNER DENVER

Gardner-Denver Company, Quincy, Illinois

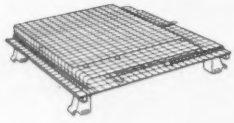
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

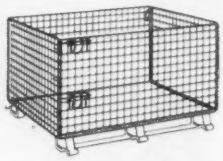
what's your..

CARRYING CHARGE?

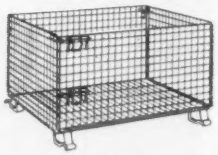


6,000 pound unit loads are efficiently and economically handled in USP Palletainers—and, empty Palletainers can be "flat-folded" for space savings and lower return rates.

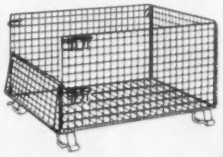




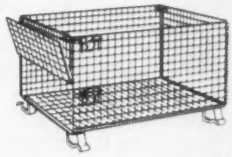
Bearing Plate



Hi-Lode



Warehouse



Bulk-Lode

What's it costing you to handle materials to and from production or assembly lines, in and out of storage, truck loading and transporting? There is an *easy way* . . . a practical, economical way with versatile USP Palletainers.

Palletainers have simplified materials handling for thousands of plants in scores of industries. And, these practically indestructible containers can save you valuable time and money both in and out of your plant. Whether you're processing, storing or distance-hauling, Palletainers provide the practical answer. Available in four basic types and a broad range of practical standardized sizes. They're engineered for safer handling, ceiling high stacking, faster 8-way entry for fork truck plus the advantages of content visibility for speedy inventory.

For Full Information on Palletainers...
including names and locations of users, or for obligation-free consultation on Palletainer application in your plant—write, wire or call Union Steel, today!

manufactured only by:

UNION STEEL PRODUCTS CO.
ALBION, MICHIGAN

loaded type and 250 hp in the floor type are available. Distributed by **Industrial Marketers,** Box 28, Ferndale 20, Mich.

For More Details Circle No. 458—Page 192

INDUSTRIAL GLOVES

Industrial gloves feature safety slogans to serve as constant reminders of general safety rules and job

hazards. Slogans can be imprinted on company's industrial and safety gloves in all popular glove styles—canton flannel, double palm, hot mill, reversible, jersey, nylon blend, leather palm, drivers' gloves, and welding gloves. Made by **Industrial Glove Division,** Riegel Textile Corp., Conover, N. C.

For More Details Circle No. 459—Page 192

MASONRY SPLITTER

Portable, nonhydraulic masonry splitter, known as "Elmer's Little Helper," gives a sharp, saw-like break to masonry solids. A fully balanced

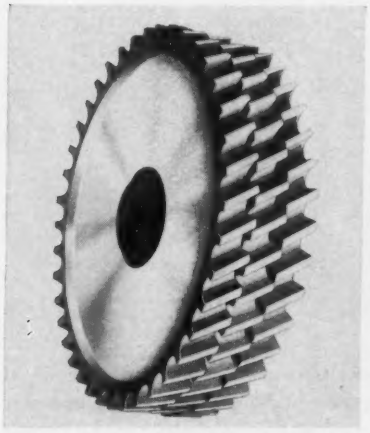
lever action reduces hand pressure to a minimum. Power for the blade is built up in a patented, back-geared ratchet that activates a roller bearing eccentric shaft. The tool provides a

16-in. rule and a square for quick, accurate measuring. End, angle, and miter cuts can be performed by the splitter. Made by **E. & R. Mfg. Co.**, Rochester, Ind.

For More Details Circle No. 460—Page 192

RUBBER CONTACT WHEEL

R-58 rubber contact wheel features deep serrations to enable the wheel to shape itself to the contours of the object being ground. Manufacturer



reports that tests have indicated that the deep groove wheel increases the life of abrasive belts up to 200 per cent. The wheels—all 1 in. in width—are available in different hardnesses, color coded so they may be combined for any width or hardness combination required. When two or more wheels are used together they leave no pattern on the work. Made by **Chicago Rubber Co.**, 651 Market St., Waukegan, Ill.

For More Details Circle No. 461—Page 192

VACUUM MELTING FURNACE

Laboratory vacuum arc melting furnace for melting, alloying, consolidating, or refining high-temperature metals and alloys can use either consumable or nonconsumable electrodes. Primarily a research furnace, the F-10 furnace has a hearth to handle a ½-lb button of titanium, or equivalent of other metal. A hearth having a maximum capacity of 3 lb can be supplied. Vacuum pumping system can be arranged to hold pressure at any desired level from 2 psi above atmospheric pressure down to a vacuum of 10 microns. Other features include a high frequency arc starter, water-jacketed casing, foot-operated switch for starting and stopping the arc, and a water-cooled hearth.—Made by **Kinney Mfg. Division, New York Air Brake Co.**, 3529 Washington St., Boston 30, Mass.

For More Details Circle No. 462—Page 192

DISGUSTED WITH ABRASIVE CLAIMS?

A metallurgical analysis shows NATIONAL CONTROLLED ABRASIVES to have three fine qualities: (1) higher carbide content—it is the iron carbides that do the cutting—so you get better and faster cleaning action; (2) a ductile matrix—unique with NATIONAL CONTROLLED ABRASIVES—that is kind to your equipment and saves substantial sums on maintenance costs; and (3) lower phosphorus content—which indicates a resistance to breakdown—producing longer abrasive life.

These qualities are no accident, but the result of a carefully controlled melting process and the specially selected high quality steel scrap from which NATIONAL CONTROLLED ABRASIVES are made.

If your abrasive job calls for "chilled"—we'll beat the others hands down with ®CONTROLLED "T" by 25% to 40%. (And you can prove it simply with a Time Meter.) If your abrasive job calls for annealed or steel—we'll beat *both* with ®PERMABRASIVE by 10% to 20%!

FREE EXPENDABLE PALLET PACK

Forty 50 lb. cartons in one master pack: easy to store, easy to inventory, easy and safe to handle. **No Extra Cost to you.** (Also in conventional 100 lb. or 50 lb. bags.)

FREE TEST SAMPLE KIT

A free, no-obligation, lab analysis on your blastcleaning efficiency. See where your money goes. **No Cost to you.**

USERS SAY

"Shot consumption records show . . . Conventional chilled iron shot at 27.8 lbs. per ton of castings cleaned . . . CONTROLLED "T" shot at 13.7 lbs."

"Quality Control Department reported 39 lbs. CONTROLLED "T" Grit per wheel-hour against 57 lbs. for the ordinary chilled used previously."

"A check of comparative costs shows that abrasive costs per wheel-hour with PERMABRASIVE are now almost exactly 20% less than with (blank) Steel Shot. Personnel most pleased with the finish received with PERMABRASIVE."

NATIONAL METAL ABRASIVE COMPANY
3560 Norton Rd. • Cleveland 11, Ohio
101 E. Main Street • Chicago Heights, Illinois
Sole manufacturers of ®Permabrasive and ®Controlled "T" abrasives.

Sold Exclusively by
HICKMAN, WILLIAMS & COMPANY (Inc.)
Chicago · Detroit · Cincinnati · St. Louis · New York · Cleveland · Philadelphia · Pittsburgh · Indianapolis

Exclusive West Coast Subdistributors
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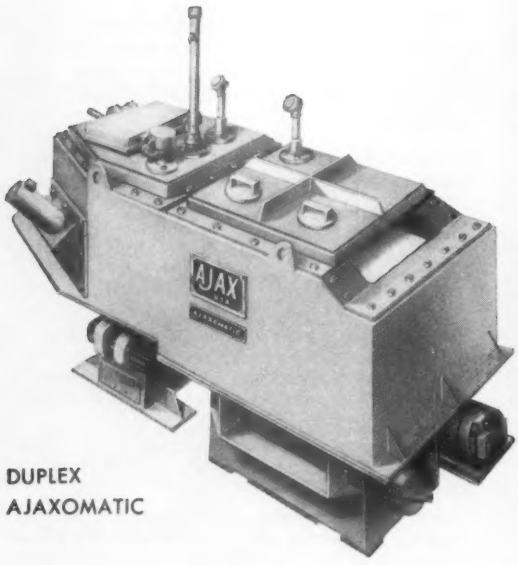
Los Angeles · Oakland

WRITE DEPARTMENT 9C

CAN WE STILL AFFORD HAND-LADLING?

AJAXOMATICS

bring automation to die casting



DUPLEX
AJAXOMATIC

The Duplex AJAXOMATIC melts aluminum pig and gates right at the die casting machine. By pushing a button the operator initiates the complete casting cycle: the die closes and the Duplex AJAXOMATIC pours the exact required amount of molten metal directly into the cold chamber. The operator just removes the finished casting at the end of the cycle.

Automation, however, is only part of the AJAXOMATIC story. The Duplex AJAXOMATIC also gives assurance of consistent quality. The quality of a finished casting begins with the proper melting of the metal. 60 cycle induction with its two basic features of internal heating and electromagnetic stirring is used exclusively in the Duplex AJAXOMATIC. Here are the unique characteristics of the Duplex AJAXOMATIC:

Precision temperature control — at low temperature	No supply ladle system or hand ladles
Alloy uniformity — no segregation	Precise weight of automatic pour
No gas porosity	Comfortable working conditions
Low metal loss	Low maintenance

The standard Duplex AJAXOMATIC is rated 120 kw to produce 500 lbs per hour of castings ranging from ½ lb to 30 lbs. Other AJAXOMATICS are available to suit a wide range of production requirements, including units supplied from central melting systems. May we have an opportunity to study your requirements?

AJAX USA

60 CYCLE INDUCTION MELTING

ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955	827,162	165,482	298,349	355,203	.....
1956					
Oct.	73,415	14,402	21,120	37,792	110,818
10 mo.	658,572	144,230	204,191	309,352	.....
Nov.	69,058	14,346	20,673	33,938	113,356
Dec.	66,951	13,405	20,557	32,940	118,185
Total	794,581	171,181	245,421	376,230	.....
1957					
Jan.	72,999	14,201	20,963	37,194	116,088
Feb.	69,451	13,366	21,707	34,311	107,869
Mar.	74,527	13,914	22,974	37,521	107,963
Apr.	68,284	14,287	20,376	33,493	98,113
May	65,108	12,705	20,708	31,602	94,748
June	58,547	11,585	17,180	29,700	85,086
July	52,173	10,447	16,322	25,339	89,430
Aug.	55,735	10,996	18,398	26,319	89,326
Sept.	58,692	11,367	17,820	24,900	93,720
Oct.	64,140	11,570	20,543	31,936	91,817
10 mo.	639,656	124,438	196,991	312,315	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1955	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
10 mo.	792,799	465,389	680,731	389,169	112,068	63,502	.....
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Jan.	85,977	51,508	71,689	43,401	14,288	8,107	93,886
Feb.	78,028	46,729	65,411	39,590	12,617	7,139	90,725
Mar.	78,013	48,311	64,560	23,915	13,453	7,666	89,431
Apr.	80,271	51,320	65,990	42,810	14,281	8,510	83,116
May	76,504	46,277	63,058	38,072	13,445	8,205	79,787
June	72,556	44,639	59,829	36,892	12,727	7,747	76,331
July	57,748	34,876	45,101	27,290	12,648	7,586	80,694
Aug.	65,426	39,644	55,320	33,781	10,106	5,863	84,876
Sept.	62,457	38,397	52,281	31,658	10,176	6,739	83,385
Oct.	77,667	45,989	65,043	39,269	11,624	6,720	82,995
10 mo.	734,647	447,690	609,282	356,678	125,365	74,182	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955	1,008,998	905,867	63,111	.....
1956				
Oct.	81,049	73,058	4,104	54,363
10 mo.	828,243	743,592	49,639	.....
Nov.	72,866	65,022	4,114	52,643
Dec.	65,197	57,931	3,769	56,556
Total	966,306	866,545	57,522	.....
1957				
Jan.	82,025	73,202	4,510	57,422
Feb.	72,084	64,346	4,188	54,133
Mar.	77,418	69,258	4,445	49,135
Apr.	77,167	69,141	4,316	48,148
May	75,347	67,251	4,421	46,791
June	70,959	63,910	3,590	44,232
July	60,621	54,847	3,010	44,175
Aug.	71,233	64,953	3,278	40,446
Sept.	70,804	64,470	3,243	40,298
Oct.	81,836	74,391	3,693	39,063
10 mo.	739,494	664,769	38,644	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955	27,854	25,294	....
1956			
Oct.	3,442	3,187	7,893
10 mo.	30,482	28,253	....
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245
Feb.	2,661	2,473	8,276
Mar.	2,970	2,804	7,690
Apr.	2,896	2,723	7,542
May	2,832	2,706	7,188
June	2,973	2,817	6,765
July	2,544	2,384	6,964
Aug.	2,315	2,150	6,222
Sept.	2,279	2,071	5,705
Oct.	2,192	2,093	5,318
10 mo.	26,869	25,238	....

PRODUCTION WORKERS

Estimated Number

	Oct. 1957	Sept. 1957	Oct. 1956
Ferrous	191,700	187,600	200,500
Nonferrous	62,800	62,100	68,600

Average Weekly Earnings

Gray Iron	85.19	85.80	84.84
Malleable Iron	84.07	87.47	85.67
Steel	92.97	96.32	96.87
Nonferrous	91.64	93.26	91.69

Average Weekly Hours

Gray Iron	38.2	39.0	40.4
Malleable Iron	37.7	39.4	40.6
Steel	38.9	40.3	42.3
Nonferrous	39.5	40.2	41.3

Source: Bureau of Labor Statistics.

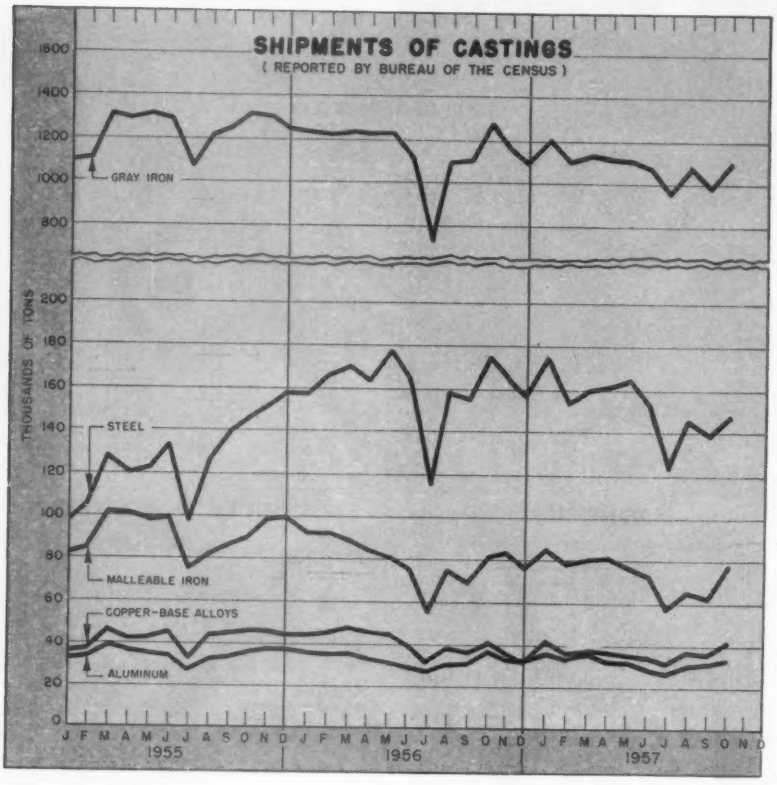
GRAY IRON CASTINGS—SHIPMENTS (Net tons[1])

	All Castings		Miscellaneous Castings		Nodular Iron Castings	Heavy Steel Ingot Molds	Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	Total	Total	Total[3]	Total[3]	
1955	14,837,745	7,987,205	9,161,685	3,715,963	.....	2,739,864	385,041	1,681,630	889,558	.....
1956										
Oct.	1,274,734	734,384	749,200	331,069	.....	252,203	30,978	171,377	70,976	996,351
10 mo.	11,575,962	6,741,233	6,863,429	3,065,270	.....	2,118,181	352,465	1,538,306	703,581	.....
Nov.	1,175,572	634,856	720,263	303,938	.....	251,242	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	.....	254,763	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
Jan.	1,213,215	642,317	761,697	320,058	.....	261,961	31,139	101,069	57,346	904,869
Feb.	1,103,118	582,010	705,585	302,514	.....	230,126	30,079	89,146	48,182	931,054
Mar.	1,133,146	604,481	713,767	305,104	.....	214,775	36,995	108,158	59,451	934,847
Apr.	1,120,349	611,443	699,395	298,319	.....	192,199	36,979	128,710	63,066	899,074
May	1,112,096	625,496	674,460	291,557	11,206	192,336	34,406	141,685	69,209	879,825
June	1,058,464	599,494	630,513	274,115	10,207	193,640	32,087	131,360	70,864	853,012
July	954,102	523,489	565,897	243,187	10,901	190,434	31,209	106,532	60,030	879,976
Aug.	1,075,957	596,779	630,130	265,185	10,339	205,655	28,976	238,209	72,987	825,676
Sept.	990,139	563,477	579,444	259,649	10,253	202,911	23,681	119,689	64,411	805,301
Oct.	1,099,554	601,109	668,895	282,024	11,974	210,521	26,306	122,149	71,683	740,169
10 mo.	10,860,140	5,950,095	6,629,783	2,841,712	.....	2,094,558	311,857	1,286,707	637,229	.....

STEEL CASTINGS—SHIPMENTS (Net tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1955	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
10 mo.	1,609,148	1,259,821	307,554	1,184,230	934,106	256,428	406,918	325,715	20,026	.....
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Jan.	169,240	133,826	30,090	125,389	98,533	27,739	43,851	35,293	2,351	519,575
Feb.	154,932	121,667	27,181	114,805	89,480	25,950	40,127	32,187	2,121	511,806
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
Apr.	162,498	124,549	29,708	122,894	93,512	27,624	39,604	32,037	2,084	497,632
May	164,575	125,431	32,840	124,840	94,635	30,926	39,735	30,796	1,914	504,990
June	153,647	119,353	31,338	116,759	91,009	28,766	36,888	28,344	2,572	494,267
July	122,018	90,037	22,803	91,730	67,719	21,426	30,288	22,318	1,377	489,390
Aug.	145,926	111,080	33,641	113,167	86,407	31,639	32,759	24,673	2,002	471,190
Sept.	139,002	105,611	29,718	106,261	80,871	27,885	32,741	24,740	1,863	438,510
Oct.	146,397	113,216	31,477	110,100	85,144	29,320	36,297	29,272	2,157	395,907
10 mo.	1,518,379	1,169,186	298,764	1,147,034	880,776	278,038	371,255	290,607	20,726	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1957

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955	75,150,247	76,266,385	3,154,052
1956			
Oct.	6,742,483	6,951,386	253,147
10 mo.	60,994,165	59,312,872	2,391,300
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082
1957			
Jan.	6,857,640	7,096,024	241,014
Feb.	6,211,845	6,302,583	228,569
Mar.	6,894,121	6,803,311	232,266
Apr.	6,436,273	6,396,900	226,698
May	6,632,519	6,521,817	219,675
June	6,362,335	6,318,339	188,487
July	6,501,266	5,888,057	180,014
Aug.	6,518,060	6,400,036	206,907
Sept.	6,296,519	6,186,475	199,226
Oct.	6,274,406	6,135,026	214,576
10 mo.	64,984,984	64,048,568	.....

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	21,948
Apr.	25,808	23,507
May	23,437	22,037
June	18,842	18,888
July	17,364	16,695
Aug.	23,812	19,654
Sept.	20,929	19,870
Oct.	23,045	22,800
Nov.	21,818	19,767
Dec.	18,046	.....
Total for year	274,096	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1955	778,000	493,244	.....
1956			
Oct.	65,921	42,414	75,706
10 mo.	569,702	372,765	.....
Nov.	65,443	40,189	74,623
Dec.	58,583	36,562	75,293
Total	693,728	449,516	.....
1957			
Jan.	67,964	42,189	75,503
Feb.	59,793	36,580	74,739
Mar.	61,378	40,593	64,466
Apr.	54,982	34,801	59,534
May	53,565	35,676	66,712
June	49,356	33,206	64,137
July	48,379	29,418	64,043
Aug.	49,829	34,040	64,789
Sept.	47,736	33,838	68,122
Oct.	62,332	39,990	69,275
10 mo.	555,315	360,331	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	188.4
Mar.	152.7	127.0
Apr.	135.2	101.1
May	207.0	136.2
June	156.7	187.5
July	110.3	98.6
Aug.	188.3	231.3
Sept.	114.7	113.9
Oct.	122.2	145.3
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace—Cupola Total	By Types of Furnace—Air Total	By Types of Furnace—Electric Total
1955	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Sept.	6,231,017	738,824	84,627	841,783
9 mo.	52,416,267	7,382,036	853,605	7,200,585
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
Dec.	6,264,955	722,320	82,160	851,770
Total	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Jan.	6,630,804	874,764	102,782	927,499
Feb.	6,038,436	804,185	93,902	834,843
Mar.	6,294,038	814,372	92,534	903,149
Apr.	5,813,309	835,027	97,289	807,922
May	5,753,435	812,141	92,260	786,210
June	5,430,607	744,790	80,063	705,590
July	4,897,752	652,773	68,504	629,395
Aug.	5,299,543	765,877	81,941	759,517
Sept.	5,033,998	721,125	82,948	672,597
9 mo.	51,214,922	7,025,054	792,223	7,026,722

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
11 mo.	68,019,062	2,253,116	3,410,605	55,851,175	6,567,495	54,333,612	4,028,023	220,587	173,225
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	60,571,150	4,419,655	242,144	190,386
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	6,482,472	423,660	22,989	20,431
Feb.	6,596,133	154,543	294,491	5,414,732	730,794	5,860,099	369,206	20,743	19,443
Mar.	7,179,100	168,650	347,451	6,008,135	654,864	6,155,334	370,915	20,241	23,259
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	5,586,587	369,359	20,495	19,756
May	6,877,052	258,638	313,583	5,720,212	584,619	5,862,966	362,085	19,201	17,869
June	6,593,326	243,789	318,906	5,436,203	594,428	5,672,086	335,574	17,044	17,744
July	6,625,901	221,929	336,590	5,515,736	551,646	5,558,702	306,119	14,735	17,992
Aug.	6,719,763	228,378	298,269	5,451,691	741,425	5,769,995	349,988	17,540	25,948
Sept.	6,569,074	218,297	292,244	5,272,056	786,477	5,645,036	321,728	17,084	28,638
Oct.	6,454,450	164,944	303,104	5,390,851	595,551	.....	.....	.....	.....
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	.....	.....	.....	.....
11 mo.	73,344,087	2,110,521	3,468,438	60,736,515	7,028,613	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

Beach wear by Jantzen

Undoubtedly the finest malleable abrasive on the market! Here's why: Better material to start with. Extreme care in forming and screening. Finally, the round, clean shot is highly malleable-ized in automatically-controlled, continuous-feed furnaces. Mod-ern methods — better shot! Mass production—lower prices! That's "SUPER-ANNEALSHOT"!

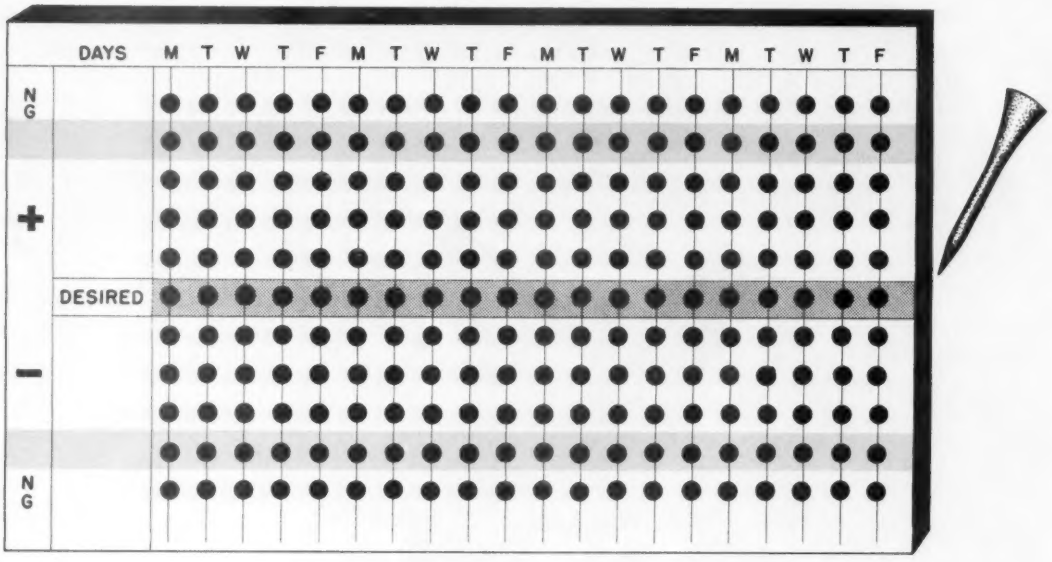
METAL BLAST, INC.

872 EAST 67th STREET

CLEVELAND 3, OHIO

Trouble Shooting

By C. W. AMMEN



Three peg boards of this type are made up—one each for permeability, moisture, and green compression. Top and bottom color bars represent upper and lower limits, respectively. Black bar is the desired value. Golf tees can be used as markers

Visual Sand Control

Dear Charlie:

We must be nuts, but since we have moved over into a synthetic system sand, we seem to run off the dead end every so often and have a rough time getting back on the track. We know that sand control is most important—we have a book, a permeability meter, rammer tubes, a balance, a moisture detector, and a green compression instrument. We are too small to carry out extensive sand testing or have a huge sand lab—the kind from soup to nuts.

How the devil does one know when to start cutting back on an additive or increasing one? We make up sand tests every day and have a big collection, but have trouble correlating our findings with the mill. Every so often, our finish gets progressively worse until we have to make such large additions that we wind up in trouble. The same goes for our green strength, etc.

Sincerely,
Sam

Dear Sam:

You are not alone. Many small and medium operations are faced with the same problem. Even some large shops with big, well equipped sand labs have little or no control of their sand, hard as this might be to believe.

Before going into any detail on controlling your sand, I will go on record to say that without a set of U. S. Standard sieves and a shaker to track your grain distribution, you might as well chuck the other equipment and use the Columbus style of navigation—walk along the bottom and feel your way along. There is a minimum of equipment, and anything less will do you little or no good.

Change Is Gradual—Contrary to some beliefs, a system sand does not change its properties abruptly. It progressively moves one way or the other, having for the most part a fairly wide range of workability, and only appears to the foundryman to have gone west overnight. In reality, it slowly slips off into the night until one day, like a stretched rubber band, it finally gives up the ghost.

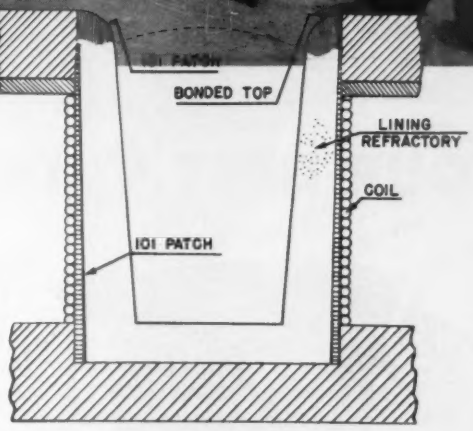
Have you heard anyone say, "This sand was O.K. just the other day. Now what's wrong?" You bet your double eagle you have.

I doubt that you could count the foundries which have some sand testing equipment, such as it is, stuck away gathering dust and rust.

I once did a stretch in a southern foundry that had a bright young lad who came out of his nest twice a

USE

TASIL NO. 101 PATCH



for high frequency induction furnaces

TASIL (Taylor Sillimanite) No. 101 Patch is widely used by operators of high frequency induction furnaces for coating of the inner surface of the water-cooled, primary coil. When air dried, this coating will:

1. **Protect the coil when the crucible is being rammed in place.**
2. **Protect the coil from damage in the event of a leakage of metal through the lining proper.**

Properties which qualify TASIL No. 101 Patch for this service are: *high di-electric strength . . . smooth working properties . . . softening point above 3200° F. . . . negligible shrinkage or expansion . . . can be used with either an acid or basic lining.*

There is a complete line of TASIL (mullite), TAYCOR (corundum-base) and TAYLOR ZIRCON Ramming Mixes and Cements for every metallurgical need. Write for recommendations to cover your melting requirements.

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IN THE METALLIC MIX

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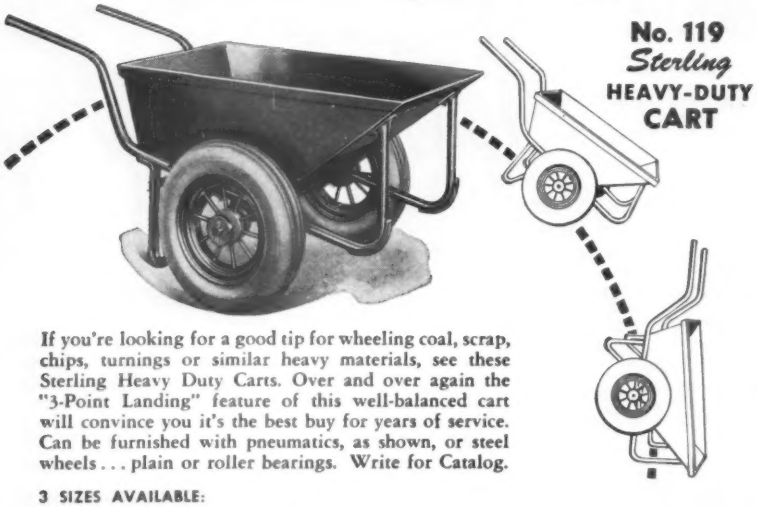

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Circle 690 on Page 51

day and ran some rapid and inaccurate sand tests which he entered into a notebook. Then he placed the notebook under his arm and went away. No joke!

Now to your control problem.

The most popular and simple system used in a small or medium shop is the visual tracking of the sand, keeping it within a given set of tolerances carried out with a peg board at the mill. Consistent results are had only by the muller operator's developing and sticking to a good, sound, regular routine. Correct measurements of the ingredients, using same mulling time with each batch, etc., play an important part in getting the results you want.

Control with respect to sand means to regulate, keeping the desired properties within certain bounds. It must be remembered that only when the limitations of lab control are fully recognized can a satisfactory system be arrived at which will give consistent results. The elimination of variables in the foundry requires eternal vigilance and attention to the hundreds of small, seemingly unimportant details encountered daily. In addition, it demands a lot of know-how.

Provide Three Boards—About the peg boards. Three plywood peg boards are made up. One represents permeability, one moisture, one green compression. Each board has sufficient horizontal holes to peg the moisture, perm, and green compression for four working weeks, or twenty days, and each has sufficient vertical holes to give you the desired plus or minus of your selected working range for the type of sand you have chosen. A black line is painted horizontally at the point where you want your desired values to be on each board, and two red lines are placed parallel to the black line, one above and one below. These indicate the upper and lower limits (or your working range).

Daily tests are made, and a peg is placed in each board for the day, showing the average moisture, perm and green compression. Next day, the boards again are pegged in the same manner. This procedure gives you a day-to-day, week-to-week, visual picture of the movement of the sand's properties and the direction in which the sand is moving. At the end of each week, the peg graphs are studied to determine what changes, if any, are necessary to the system.

A batch is dropped into the mill and adjusted to give the desired average properties. The adjustments are recorded, and each batch thereafter is adjusted until the entire system or number of batches in the sys-

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Compatible as Smith L-O is with sand, we recognize that there are always certain conditions that require specialized attention. We suggest, therefore, that you call in a Smith representative—a man of broad, "shirt-sleeve" experience—who will study your conditions and come up with a sound recommendation on the grade of Smith L-O you should use. Take advantage of his valuable assistance for his help is further proof that Smith L-O *stands also for a service as well as a product.*

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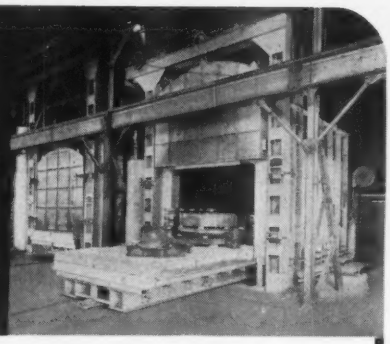

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By A. J. Murphy

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tem is adjusted. At this point, the operator returns to his regular amounts and kinds of additives for incoming batches. This, of course, applies to all types of adjustments needed to re-establish a given set of properties. After several weeks of this type of tracking, you should have a clear picture of what the normal daily batch additives and their amounts should be. These then are changed and run for a week or so and adjusted as needed. This system soon allows you to reach a point where your daily batch additives are of the proper amount and kind so that the system will not vary much from week to week and will require only minor adjustments.

All sand testing should be done for the purpose of tracking its movement and change, not as a last resort after you are in deep trouble —that is, a postmortem.

The peg board at the mill has a very good effect on the muller operator. It forms a much closer relationship between him and the lab and gives the operator a greater sense of importance and interest.

It's Often Neglected—Now the grain distribution. This is one of the most important factors involved in producing quality castings and often is neglected. It must be remembered that the AFS grain fineness number is approximately the number of that sieve which would just pass the sample if its grains were all of a uniform size. It is an average grain size number. As long as you remember that a two-screen sand can show the same AFS fineness number as, say, a six-screen sand, you can keep out of trouble.

Make sure, regardless of the AFS fineness chosen, that your sand has a uniform spread over five or six adjacent sieves. This goal is accomplished by blending two or more sands. Two sands of the same AFS fineness can be like night and day in performance and results. Check that all-important grain distribution. Each week, show it visibly in test tubes or make up a partitioned, glass-sided box for this purpose and, as with your peg board, establish a visible marking showing the limits.

A good all-purpose brass sand for general work usually is composed of a good sharp sand of AFS fineness 90 to 140 with about 10 per cent low-bond bank or naturally bonded sand of AFS fineness 150 to 200. Bond with southern bentonite, ½ to 1 per cent wood flour, and 3 to 5 per cent moisture.

Sincerely,
Charlie

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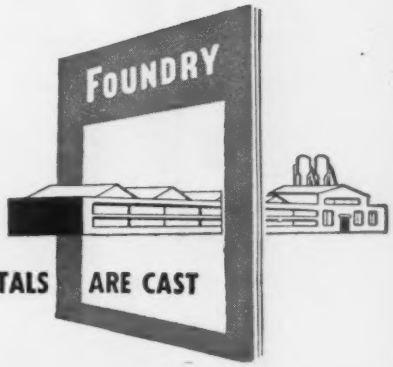

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WHEREVER METALS ARE CAST

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Circle 688 on Page 51

Foundry Group Meetings

Northeastern Ohio: Nearly 250 members and guests attended a joint meeting of the AFS chapter and the American Society for Quality Control, Cleveland Section, at the Tudor Arms Hotel, Cleveland, on Jan. 9. Dr. W. Kenneth Bock, director of research, National Malleable & Steel Castings Co., talked on "Quality Control Is Old Stuff," prior to a panel discussion on the same subject. Karl G. Presser, quality control engineer, Forest City Foundries Co., was technical chairman.

Panel members were Thomas R. Gauthier, works chief metallurgist, Aluminum Co. of America; Arnold L. Robertson, director of quality control, Superior Foundry Inc.; Donald Leckie, planning engineer, Republic Steel Corp., and W. H. Williams, purchasing agent, Eaton Mfg. Co., all of Cleveland.

Dr. Bock suggested that there is nothing new about quality control; foundrymen have been practicing it for years. Perhaps one of the most important assets of a statistical quality control program is the speed with which corrective action can be taken when a change in quality is indicated through changes in the process. Quality control need not be complex. Satisfactory results can be obtained from the simplest kind of a program if it will serve notice quickly that changes—both good and bad—are taking place.

Each panelist offered his comments concerning Dr. Bock's talk and participated in a lively discussion period. It was generally agreed that quality control in the foundry should not become formidable but should be as elementary as possible to keep controls within tolerable limits so shop people can live with the production processes. The human element is the factor probably the most difficult to control. It is not merely a question of the type of work being done but the type of people doing the work.

Prior to the technical discussion, Paul W. Kuckuck, president, ASQC chapter, spoke briefly and thanked the AFS for the opportunity to join in the meeting and share ideas. William N. Davis, exhibit manager, AFS, spoke briefly on the highlights of the AFS convention and exhibition to be held in Cleveland, May 19-23.—*Kenneth L. Mountain.*

New England: First Ladies' Night for the AFS chapter was held Dec. 10 at the University Club, Boston, with about 300 members and guests present. Social hour, buffet dinner, door prizes, entertainment, and dancing highlighted the program. —*Fred S. Holway, Mystic Iron Works.*

Michiana: William Oakley, vice president, Delhi Foundry Sand Co., Cincinnati, discussed the "CO_2 Process" at the Dec. 9 meeting of the AFS chapter at Club Normandy, Mishawaka, Ind. Techniques of the process, applications, costs, types of

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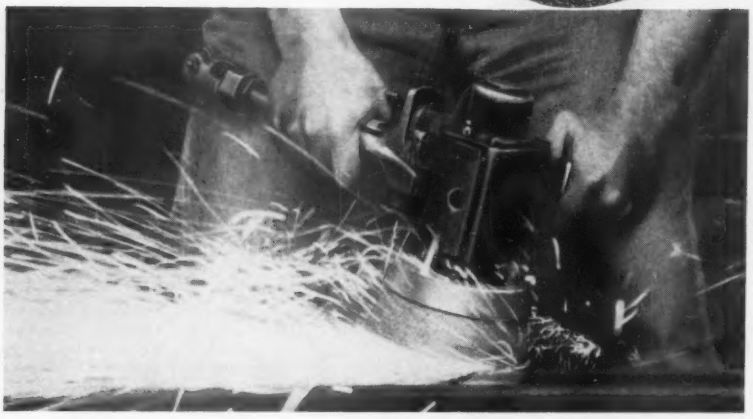
float through the roughest jobs . . .



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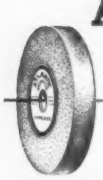

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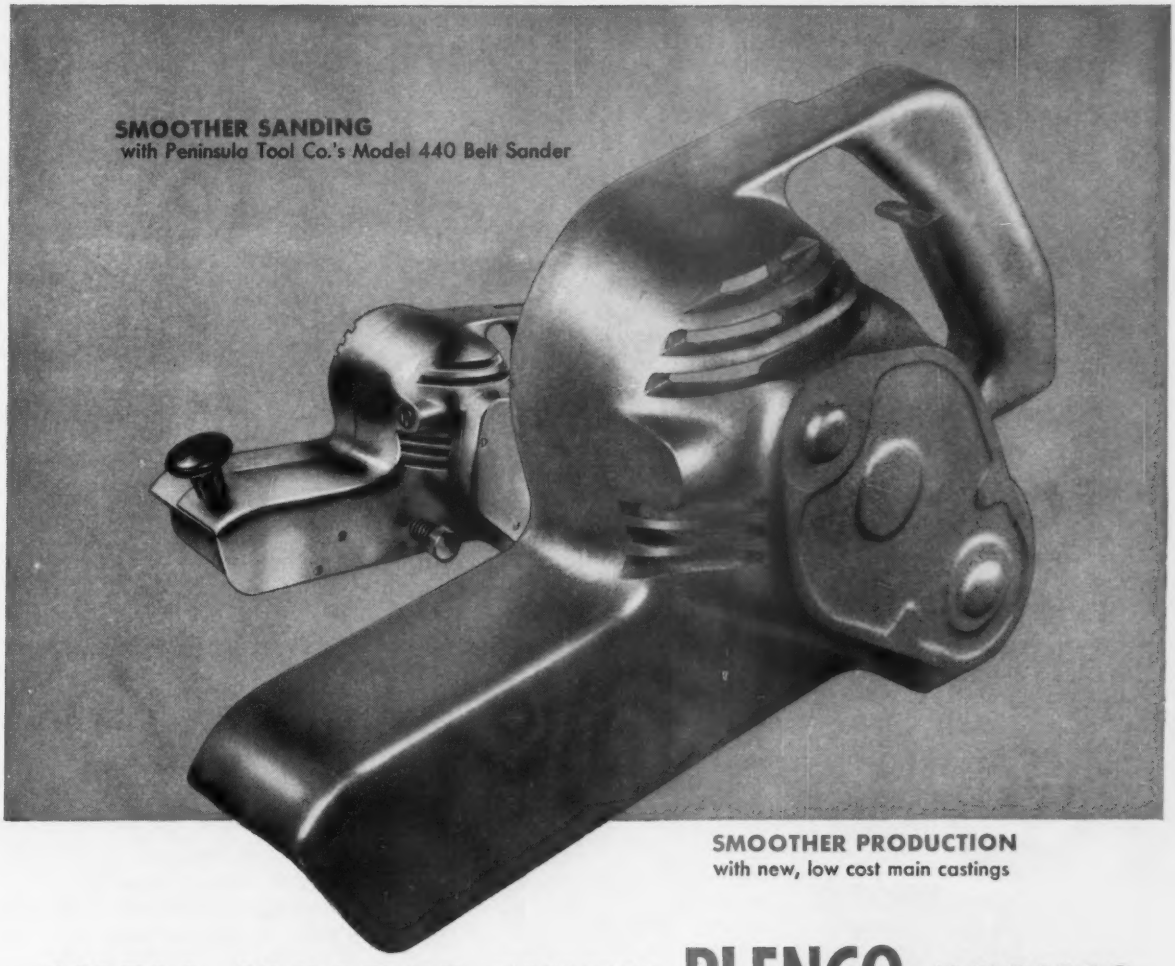

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To manufacture the main castings of this belt sander, The Peninsula Tool Company, Inc., explored several methods before settling on shell molding. Production Engineer D. E. Jones states: "The castings were rather complicated to make and to machine. We wanted to eliminate as much machining as possible, particularly in regard to the cooling slots.

"It was obvious that sand casting was out. We considered die casting with a permanent mold, but the sander was a relatively low production tool and the die cost per part would be extremely high.

"We decided on shell molding with Plenco resins, and we're glad we did. The cost of finishing the shell casting was 60% less than finishing a green sand casting. Also, we cut our machining costs by 35%. And the actual cost of the shell casting, including molding time, materials and shake-out, resulted in a total savings of 40% . These savings were the direct result of the cooperation and engineering assistance that we received from the Plastics Engineering Company."

SHELL PATTERNS SAVE $11,000

To die cast the main casting of the Peninsula sander would have required dies costing an estimated $12,000 to $15,000. Yet, the cost for shell patterns came to less than $1,000 for all the patterns. Savings in this area alone amounted to at least $11,000. Further savings were realized by eliminating the need for machining the cooling vent slots and other open areas.

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sand required, additives, advantages and disadvantages were covered in detail.

Harry W. Dietert, Harry W. Dietert Co., Detroit, national president, AFS, and Gerald R. Rusk, president, Freeman Supply Co., Toledo, Ohio, national director, AFS, were guests of the chapter.

Toledo: The AFS chapter's annual National Officers and Management Night meeting was held at Heathersdown Country Club, Toledo, Ohio, on Dec. 4. Featured speaker was Frank G. Steinebach, editor, FOUNDRY, on the subject "Future of the Foundry Industry." Harry W. Dietert, Harry W. Dietert Co., Detroit, national president, AFS, and Gerald R. Rusk, president, Freeman Supply Co., Toledo, national director, AFS, represented the national organization. Management personnel from 32 concerns in the area attended the meeting.—*Don J. Catron, Freeman Supply Co.*

St. Louis: "Molding Sands and Molding Methods" was the subject of E. H. King, vice president and general manager, Hill & Griffith Co., Cincinnati, as he talked to 138 members and guests of the AFS chapter at its Dec. 12 meeting at Edmond's Restaurant, St. Louis. Technical chairman was Raymond E. Miller, American Brake Shoe Co., National Bearing Division.—*H. V. Boemer, Great Lakes Carbon Corp.*

Saginaw Valley: The AFS chapter met Dec. 5 at Frankenmuth, Mich., to hear two guest speakers discuss plastics. Harry W. Dietert, Harry W. Dietert Co., Detroit, national president, AFS, attended the meeting and discussed briefly the national AFS organization and its efforts on behalf of local chapters.

Andre B. Kerr, development engineer, Bakelite Co., New York, discussed future plastics for foundry pattern applications. He covered the present use of plastics in foundries as well as new work being done on phenolic and epoxy bonding problems. W. R. Weaver, president, Modern Pattern & Plastics Inc., Toledo, Ohio, talked on making plastics patterns and their application in present day foundries.—*R. J. Gleffe, Central Foundry Division, General Motors Corp., Saginaw Malleable Iron Plant.*

Ontario: "Cost Control" was the subject of a panel discussion at the Dec. 20 meeting of the AFS chapter at the Royal Connaught Hotel, Hamilton, Ont. Panelists were Ted Tafel Jr., American Standards

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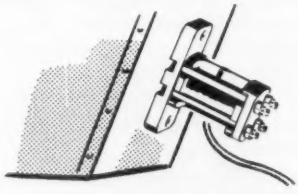

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Products (Canada) Ltd.; J. Lubenkov, Link-Belt Ltd., Elmira, and M. Johnston, Neptune Meters, Toronto. Each spoke briefly about the control systems in operation at their respective plants and outlined reasons why the installation of simple controls returns dividends.

Clarence Dorson, retired, National Iron Division, Canada Iron Foundries; Walter Price, melt foreman, Welland Iron & Brass Ltd.; George Stewart, pattern shop foreman, Canadian Westinghouse Co., Foundry Div., and Jerry J. Dillion, plant superintendent, Galt Malleable Iron Ltd., were presented pins in honor of 50 years of service to the foundry industry.—*P. J. Provias, International Nickel Co. of Canada Ltd.*

Chicago: At its Jan. 6 meeting the AFS chapter paid recognition to management and its past presidents. Speaker for the annual event was Robert L. Reid, director, Executive Program, University of Chicago, who discussed "Problems and Prospects in Executive Development."

L. F. Bartosz, National Malleable & Steel Castings Co., and chairman of the Educational Committee, briefly outlined the educational course on "Four Methods of Coremaking" to be conducted in March. The course will be initiated at the regular chapter meeting on March 3 with Elmer C. Zirzow, director of foundry service, Werner G. Smith Inc., Cleveland, and chairman of the AFS Sand Division, speaking on "Why Four Methods of Coremaking." Lecture sessions will follow on March 10 and 17 at the Peoples Gas Auditorium.

Chapter Vice President Don G. Schmidt, metallurgist, H. Kramer & Co., introduced Mr. Reid, who, in emphasizing the valuable aspects of formal management development, pointed out that the training program is formulated to accommodate the needs of men desiring to become managers and men who already are managers.

In the past, the speaker stated, the responsibility for developing executives was one for the existing management and as recently as 1940 there were no executive development programs in existence. Today there is a realization of the growing need for professional managers. Key questions, according to Mr. Reid, are who shall be trained and what do you teach them. Among the subjects which should be included, he mentioned accounting, marketing, and industrial relations.

Four group meetings will feature the next chapter meeting, Feb. 3. Clyde A. Sanders, vice president, American Colloid Co., Chicago, will discuss "Molding Methods Compared" before the nonferrous and gray iron divisions. Richard W. Heine, associate professor, metallurgy department, University of Wisconsin, Madison, Wis., will address the Malleable division on "Controlling Malleable Iron Scrap." "Vacuum Melting" will be discussed by Francis H. Hohn, metallurgist, Scullin Steel Co., St. Louis, before the Steel and Maintenance divisions. The Pattern division will hear Harrison Weaver Jr., director of engineering, Brillion Iron Works Inc., Brillion, Wis., describe "Patterns for Shell Molding." —*Erle F. Ross.*

Lehigh Valley: Lehigh Valley Foundrymen's Association held its second meeting of the season at Alumni Engineering Hall, Lafayette College, Easton, Pa., on Dec. 3. W. F. Straight, research and development engineer, Bethlehem Steel Co., Quincy Yard, Quincy, Mass., discussed "Engineered Castings" and supplemented his remarks with slides and sample castings.

Mr. Straight stated that through careful attention to good foundry practices and wise adoption of new methods many castings can be made to close tolerances and machining costs reduced as much as 50-75 per cent. Foundrymen expressed considerable interest in threaded fittings accurately cast to size by CO_2 core practice. A color motion picture, "Installation of the George's Bank Radar Station," more commonly known as the "Texas Tower," was shown prior to the technical meeting.—*Robert B. Fischer, Ingersoll-Rand Co.*

Wisconsin Foundrymen To Meet At Milwaukee on Feb. 13-14

Wisconsin Chapter of the AFS in co-operation with the University of Wisconsin has arranged a comprehensive program of technical papers for its 21st annual Regional Foundry Conference. The meeting will be held Feb. 13-14 at the Hotel Schroeder, Milwaukee.

The conference committee is headed by Leslie J. Woehlke, Spring City Div., Grede Foundries Inc., Waukesha, Wis., as chairman. Conference reservations are being handled by Bradley H. Booth, Carpenter Brothers Inc., Milwaukee.

The conference will be opened with a general session Thursday morning. Five simultaneous technical sessions are scheduled for that afternoon and Friday morning and afternoon. These meetings will cover subjects pertaining to malleable, nonferrous, gray

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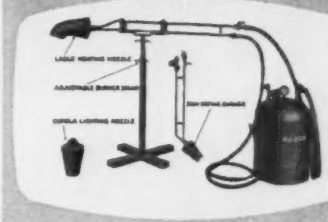

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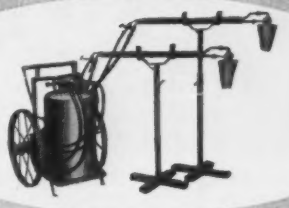

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iron, and steel castings and pattern-making. Luncheon meetings will be held both days, and the annual banquet Thursday evening will be addressed by Gov. Vernon W. Thomson of Wisconsin.

The program follows:

Thursday, Feb. 13

9 a.m.—Registration.

10 a.m.—Opening addresses: **Planning for the Future,** Dean Kurt F. Wendt, University of Wisconsin; **The Man We Employ,** Harry W. Dietert, president, AFS; **Horizons Unlimited,** Allen M. Slichter, Pelton Steel Casting Co., Milwaukee.

10:50 a.m.—General Meeting: **Safety Aspects of New Foundry Processes,** Dr. Edward G. Meiter, Employers Mutual Liability Insurance Co.

12 Noon—Luncheon: **Political Business,** Carl Taylor, president, Waukesha State Bank.

2:15 p.m.—Sectional Meetings.

Malleable Iron: **Cost Control in the Foundry,** R. K. Daily, Lester B. Knight & Associates Inc.

Nonferrous: **Good Aluminum Foundry Practice,** A. Nichamin, Federated Metals Div., American Smelting & Refining Co.

Gray Iron: **Water-Cooled Cupola Construction, Economics, Operation and Problems,** Mervin H. Horton, John Deere & Co.

Steel: **Deoxidization of Steel Castings,** Clarence Simms, Battelle Memorial Institute.

Pattern: **Advanced Plastics,** Robert LeMasters, Nelson Pattern Co.

4 p.m.—Sectional Meetings.

Malleable Iron: **CO_2 Core Making and Molding Gassing of Sodium Silicate Cores,** V. A. Guebard Jr., International Harvester Co.

Nonferrous: **Cost Problems in the Cleaning Room,** Oscar Kraft, Westover Engineering Inc.

Gray Iron: **Molding—Nothing Has Been Changed,** Alexander D. Barczak, Superior Foundry Inc.

Steel: **Solidification of Cast Steels and Practical Application of Exothermic Materials,** George Witt, Foundry Services Inc.

Pattern: **Pattern Engineering,** George Schuller, Caterpillar Tractor Co.

6:30 p.m.—Banquet: **Wisconsin Faces the Challenge of the Future,** Hon. Vernon W. Thomson, governor of Wisconsin.

Friday, Feb. 14

10 a.m.—Sectional Meetings.

Malleable Iron: **Foundry Maintenance,** Fred Gunther, Belle City Malleable Co.

Nonferrous: **How the Melting of Brasses and Bronzes Affect the Quality of Castings,** William M. Ball Jr., R. Lavin & Sons Inc.

Gray Iron: **Noise and its Possible Effects in the Foundry,** Dr. William L. Lea, Wisconsin State Board of Health.

Steel: **How Do You Handle Your Air-Arc Operation?** Lloyd Olson, Bucyrus-Erie Co., Steve Kline, Crucible Steel Casting Co., Arthur Hare, Grede Foundries Inc.

Pattern: **Pattern Equipment for CO_2 Process,** James Venetucci, Liquid Carbonic Corp.

12 Noon—Luncheon: **How Other People Talk,** George Gilbert Groman.

2:30 p.m.—Sectional Meetings.

Malleable Iron: **Safety and Industrial Health,** Walter Schaltz, Allis-Chalmers Mfg. Co.

Nonferrous: **Coremaking and Coreblowing,** Z. Madacey, Beardsley & Piper Div., Pettibone Mulliken Corp.

Gray Iron: **Gating of Gray Iron Castings,** John F. Wallace, Case Institute of Technology.

Steel: **Hot Tears—A Major Casting Defect,** Charles Christopher, Continental Div., Blaw-Knox Co.

Pattern: **Apprentice Program Forum,** G. Wilms, Caterpillar Tractor Co.; Erwin Czerwinski, Nelson Pattern Co.; A. Komar, Spring City Pattern Co.; L. Licau, Allis-Chalmers Mfg. Co.; George Schroeder, Fond du' Lac Pattern Co.; Carl Jurack, Charles Jurack Pattern Co.

Film Shows Band Saw Economy

A 16-mm., sound and color film, "A Production Cut-Off Band Saw," shows how cost-cutting methods are applied to basic cutoff operations by use of a 24-in. capacity, heavy-duty power saw. Machine is shown cutting various alloys, giving cutting rates and other pertinent data. The film runs about ten minutes. It is available on loan from the DoAll Co., Des Plaines, Ill.

Circle 697 on Page 51

Chattanooga Site of Annual Southeastern Conference

Chattanooga, Tenn., will be the site of the 26th annual Southeastern Foundry Conference on Feb. 20-21. This meeting, to be held at the Patten Hotel, is sponsored by the Birmingham District, Tennessee and University of Alabama Student Chapter of the AFS.

The Southeastern Foundry Conference, the oldest consecutive conference of the society, will include ten technical sessions in addition to a luncheon meeting, banquet, and plant visitations.

G. Frank Anderson, Tennessee Products & Chemical Corp., is general chairman of the conference, with Sam F. Carter Jr., American Cast Iron Pipe Co., vice chairman. Program chairman is W. L. Austin, U. S. Pipe & Foundry Co., assisted by John F. Drenning, Kerchner Marshall & Co., as vice chairman.

Friday morning will be devoted to visits to local plants, and the annual banquet will be held that evening. A separate program of entertainment has been arranged for ladies.

Program details follow:

Thursday, Feb. 20

9 a.m.—Registration.

9:50 a.m.—Opening of conference by G. Frank Anderson, chairman, Tennessee Chapter.

10 a.m.—**Future of the Foundry Industry,** Frank G. Steinebach, editor, FOUNDRY. Charles Chisholm, Wheland Co., Chattanooga, Tenn., chairman.

11 a.m.—**Safety, Hygiene, and Foundry Environment,** H. J. Weber, AFS national headquarters, Des Plaines, Ill. S. P. Alexander, International Harvester Co., Memphis, Tenn., chairman.

12:30 p.m.—Luncheon: Presiding, Jack Austin, vice chairman, Tennessee Chapter, U. S. Pipe & Foundry Co., Chattanooga. Speakers: Harry W. Dietert, national president; Lewis H. Durdin, national vice president; and W. W. Maloney, general manager, AFS.

2 p.m.—**Water-Cooled Cupola Operation,** M. J. Henley, Tyler Pipe & Foundry Co., Tyler, Tex. Sam F. Carter Jr., chairman, Birmingham Chapter.

3 p.m.—**Green Sand Molding,** T. E. Barlow, Eastern Clay Products Dept., International Mineral & Chemical Corp., Chicago. A. B. Schwarzkoff, U. S. Pipe & Foundry Co., Bessemer, Ala., chairman.

4 p.m.—**Effect of Gating Practice,** J. G. Kura, Battelle Memorial Institute, Columbus, Ohio. M. D. Neptune, vice chairman, Birmingham Chapter, chairman.

6 p.m.—Reception and dinner.

Friday, Feb. 21

9 a.m.—Plant visitations.

1:30 p.m.—**Fundamentals of a Successful Foundry Operation,** Henry Marius, Lenoir Car Works Inc., Lenoir City, Tenn. G. Frank Anderson, Tennessee Products & Chemical Co., Chattanooga, chairman. **Major Aluminum Problems and Their Solution,** D. L. LaVelle, American Smelting & Refining Co., South Plainfield, N. J. Joseph F. Delaney, Eureka Foundry Co., Chattanooga, chairman.

2:30 p.m.—**Use of Plastics in the Pattern Shop,** W. R. Weaver, Modern Pattern & Plastics Inc., Toledo, Ohio. M. H. Gunther, Strickland Pattern Works, Chattanooga, chairman. **Bentonite in Synthetic Molding Sand,** Victor E. Zang, Unitcast Corp., Toledo, Ohio. W. B. Greiser, Ross-Meehan Foundries Inc., Chattanooga, chairman.

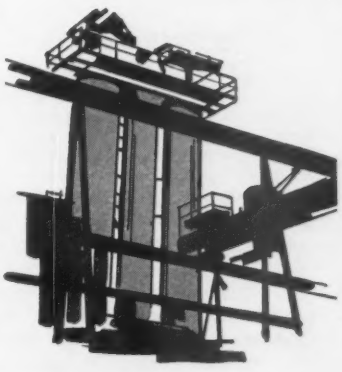
3:30 p.m.—**CO_2 Process and Coremaking,** Leroy A. Bizzell, U. S. Pipe & Foundry Co., Chattanooga. Thomas C. Alford, Tri-State Sand Co., Chattanooga, chairman.

7 p.m.—Annual banquet. G. Frank Anderson, presiding.

The big selling point for

TERRE HAUTE SPECIAL FOUNDRY COKE

is the way foundries buy it...



• They buy it for top ratings in chemical and physical qualities—for clean sizing—for uniformity that occurs alone from exceeding care.

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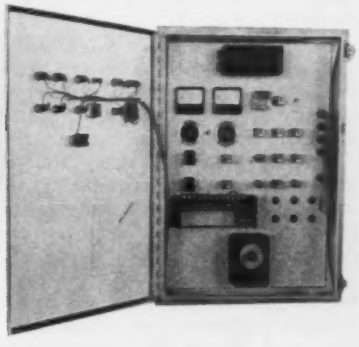
Circle 700 on Page 51

HARTLEY HYGRO-GUIDE SERIES XII $2995.00 COMPLETE



Here's Your Bargain Buy in FULL MIXING AUTOMATION!

Series XII Automatic Sand Moisture Control with Hartley Electric Time Guide operates any new or old batch type mixer—brings the accuracy, speed, economies and product improvement of automation within the reach of any foundry.

Single probe in mixer controls water as indicated by temperature and moisture of return sand. Can't double-batch! Other advantages include: Accessible and instant moisture adjustment . . . plug-in mounted relays . . . finger-tip mulling cycle regulator . . . cam operated timer with 12 stations.

Accurate—foolproof—easy to install and maintain—the Hartley Hygro-Guide Series XII comes complete in NEMA type 12, 30" x 42" x 8" cabinet, which may be located any distance from mixer.

Full particulars sent promptly on request.

HARTLEY Controls CORPORATION

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Circle 701 on Page 51

New Books for Foundrymen . . .

GRAY IRON CASTINGS

Gray Iron Castings Handbook, edited by Charles F. Walton, cloth, 620 pages, 6 x 9 in., published by Gray Iron Founders' Society Inc., National City-E. Sixth Bldg., Cleveland 14, Ohio.

The editor, with the assistance of engineering professors, research organizations, and other metalworking experts, has compiled a wealth of usable technical material for metalworking people concerned with designing, purchasing, or application of iron castings. Although written in

a practical vein, the handbook is equally valuable to engineering students.

Ten years were spent in gathering and preparing data most applicable to the design and production of serviceable, economical cast parts to meet the needs of modern industry.

A brief history of gray iron is presented in the first chapter. Advantages of modern iron castings and the casting process are covered in the next section.

Following is a comprehensive chapter on design, discussing design for strength, performance, appearance, and producibility of castings. The chapter on specifying and purchasing brings to the castings buyer up-to-date technology necessary to purchase cast parts judiciously.

Chapter five presents engineering properties of gray, ductile, white, and high-alloy irons. Advancements in properties brought about by closer technical control and new techniques during recent years are set forth.

Heat treating procedures are detailed with specific information on types, mechanisms, temperatures, times, and cooling rates. Welding, joining, and cutting of gray iron castings for fabricated assemblies are covered, and recommendations are made for machining and grinding. The final chapter discusses new methods of coating iron by spraying, brushing, welding, cementation, dipping, chemical conversion, chemical reduction, and electroplating.

COPPER ALLOYS

ASTM Standards on Copper and Copper Alloys, 6 x 9 in., 688 pages, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $6.25 (paper cover) or $7 (cloth cover).

Compilation of ASTM standards covering copper and copper alloys, cast and wrought, 34 of which obsolete those published in the 1955 edition. Included for the first time are specifications for threadless copper pipe and copper drainage tube. Products covered include basic coppers, nonferrous metals used in manufacture of copper alloys, copper, and copper alloy wrought products. Test methods for these materials accompany the specifications.

CARBURIZED STEEL

Fatigue Durability of Carburized Steel, by seven authorities, 6 x 9 in., cloth, 123 pages, published by American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Price $4.

Book provides updated information on the effective application of carburized steel to critical components. Load stress, residual stress, physical and metallurgical properties, and surface condition all are factors elaborated upon by the authors in providing a better understanding of the interrelation of these factors.

ALLOYING METALS

Boron, Calcium, Columbium, and Zirconium in Iron and Steel published by John Wiley & Sons Inc., New York, for the Engineering Foundation of United Engineering Trustees Inc. New York, 533 pages. Price $14.

Information previously scattered through hundreds of books and journals in many languages is brought together in this 15th monograph issued by the Engineering Foundation's alloys of iron research project.

The monograph series provides a reference source for engineers, metallurgists, and others concerned with the effects of alloying metals on carbon steel, simple and complex alloy steels, and cast iron. This current work, dealing as it does with boron, calcium, columbium, and zirconium as alloying metals, will be of special use to those interested in metals to be used at very high temperatures and under high pressures.

DIFFUSION IN METALS

La Diffusion dans les Metaux (Diffusion in Metals), cloth, 124 pages, 6 x 9 in., published by Bibliotheque Technique Philips, Eindhoven, Netherlands. Price, $5.25.

From time to time a group of metallurgists from France, Belgium and the Netherlands as well as specialists from other countries gather to discuss problems in metal physics. This volume in French contains eleven papers on diffusion in metals, which was the subject at a gathering of the group held in Eindhoven in September, 1956. The papers and authors include the following:

"Introduction to the Study of Diffusion," by A. D. LeClaire; "The Diffusion of Radioactive Tracers in Solids," by K. Compaan and Y. Haven; "Intergranular Diffusion and Its Relation with the Structure of Grain Boundaries," by P. Lacombe; "Intergranular Autodiffusion of Alpha Iron," by C. Leymonie and P. Lacombe; "New Observations on the Kirkendall Effect and the Electrolytic Flow in Solid Alloys," by Th. Heumann; "The Electronic Probe Microanalyzer and Its Application in the Study of Intermetallic Diffusion," by J. Philbert; "Study of the Diffusion of Uranium-Zirconium in the Gamma Phase," by Y. Adda and J. Philbert; "The Kirkendall Effect and Diffusion in the Gold-Platinum System," by A. Bolk and T. J. Tidema; "Diffusion of Inserted Atoms," by J. L. Meijering; "Study of the Non-Stationary Flow of Helium Through Silicon and Germanium by Aid of the Mass Spectrometer," by A. Van Wieringen, and "Influence of Elastic Deformation on the Mobility of Vacancies in Copper," by C. W. Berghout.

Foundry Educational Foundation

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TO THE FOUNDRY INDUSTRY:-

In these days of "Sputniks" and missiles, we hear a good deal about "crash" programs in science and engineering. These somewhat frantic proposals serve to remind us of the foundry industry's efficient and productive Foundry Educational Foundation program now in its 11th year.

The foundry industry can be proud that, through the Foundry Educational Foundation, its efforts have brought the following results:-

1. MANPOWER - Engineering employment rose 40% in the foundry industry during the period 1950-57 (overall average was 5%). Through the prudent distribution of scholarships the number of FEF students has almost tripled.

2. MARKET - Engineering students who will be castings customers and design engineers of the future are being indoctrinated with a knowledge and appreciation of cast metals. Each year, about 6000 of these students take foundry courses at FEF schools.

3. ENGINEERING FACILITIES AND FACULTIES - In addition to the manpower and market gains, the permanent additions in foundry facilities (over $2,000,000) and teaching staffs (up 400%) represent an investment of four dollars on the part of the schools for every dollar the industry has invested in the FEF.

4. CASTING TECHNOLOGY - The vast resources of facilities and brainpower at FEF schools provide a constant source of new ideas for the production of better castings at lower cost through science and engineering.

With the employment of engineers and technicians expected to rise another 30% by 1960, your FEF is expanding to meet these needs. Virginia Polytechnic Institute has just been added as our 17th school and an entirely new FEF program is being developed to produce foundry technicians to round out your engineering teams.

The Officers and Trustees want to express sincere appreciation for your support.

Very truly yours,

FOUNDRY EDUCATIONAL FOUNDATION

E J Walsh

EJWalsh/p

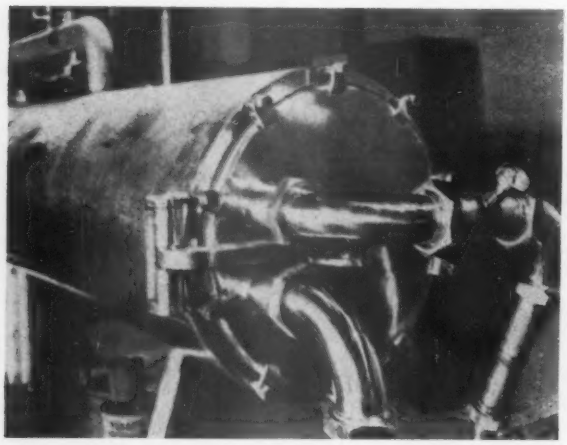
Executive Director

The Foundry Educational Foundation does not pay for this advertising. This space has been contributed by FOUNDRY magazine in support of FEF's constructive program for foundry industry progress through education.

The Shakeout

Fresh Orange Juice via Cast Stainless

WITH THE AID of cast stainless pumps, fittings, and other vital units, 650,000 gal of cold orange juice are moved quickly from an oceangoing vessel to a receiving



station on shore without warming up the juice more than a degree or two. This delicate operation in the movement of juice from Florida groves to northeastern markets is accomplished at least once a week.

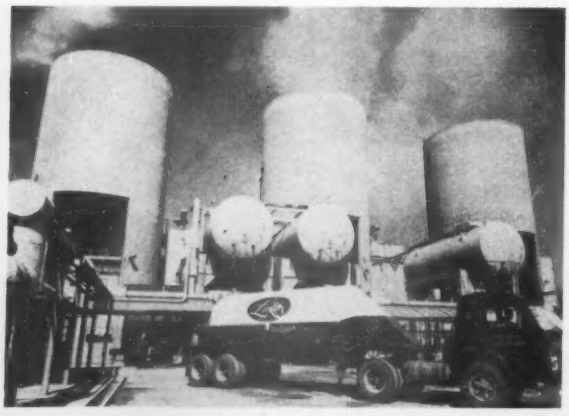
The roles of cast stainless is vital to the entire transfer. The juice is extracted in cast stainless components and is in contact only with stainless steel from that time until it is packed in cartons. Alloys used in the ship-to-shore transfer system include Alloy Casting Institute types CF-8M, CF-20, CF-8, and CF-16F.

For More Details Circle No. 465—Page 192

150 Million Cu Ft More of Liquid Oxygen

Expansion at the Ashtabula, Ohio, and Fontana, Calif., plants of Linde Co., Div. of Union Carbide Corp., New York, has added a new monthly supply of 150 million cu ft of liquid oxygen to the resources of industry. New facilities at the Ashtabula plant shown here provide 115 million cu ft, and the Fontana expansion makes possible the other 35 million cu ft.

Linde also plans to expand its Fontana output by some 430 tons of gaseous oxygen in mid-1958 and by another 115 million cu ft per month during 1959. At that time, equipment for producing argon and other gases also will be installed.



For More Details Circle No. 466—Page 192

Laminated Tires Take Heavy Punishment

AFTER 6 MONTHS of continuous service in a metal reclaiming plant, where 50,000-lb loads are commonplace and routes often are strewn with sharp metal scraps, these Mitco industrial tires still are going strong.

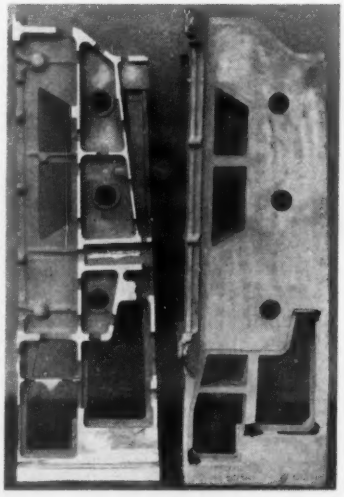
Developed by Mitchell Industrial Tire Co., Chatta-

nooga, Tenn., to eliminate work stoppages, these laminated tires are built to take large loads and to stand up under grueling punishment. Particularly valuable for heavy-duty and hazardous operations, they now are offered by 41 original equipment manufacturers.

For More Details Circle No. 467—Page 192

New Alloy Aids Conversions to Castings

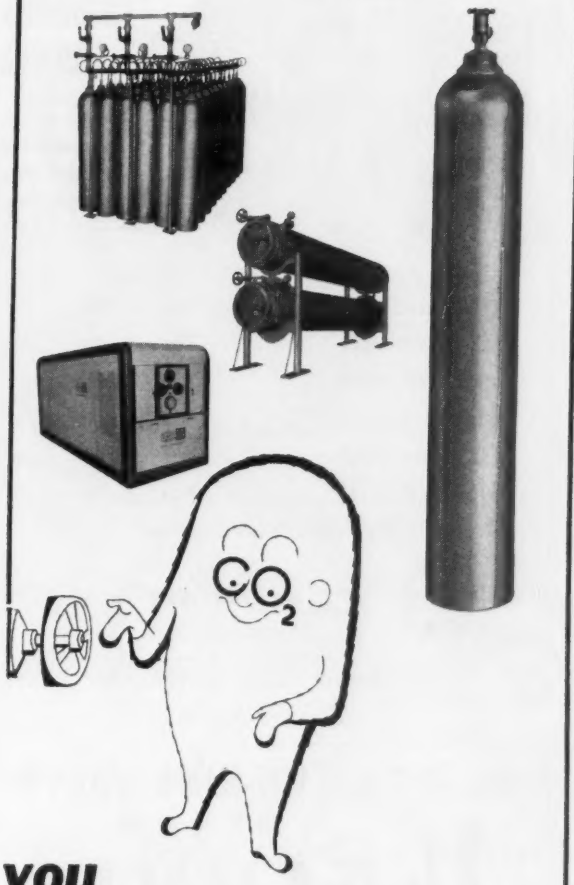
USE OF A new high-strength aluminum alloy, Tens-50, has enabled Rayson Casting & Mfg. Co., Santa Monica, Calif., to invade a field normally served by forgings. Rayson is casting the pylon, shown here, for North American Aviation's F-100 Super Sabre. The alloy was developed by the aircraft company's Los Angeles Division.



In spite of the complexity of the casting, Rayson has achieved an x-ray reject rate of less than 1 per cent. In addition, the new pylon has a higher strength-weight ratio than those made from conventional alloys. Average properties are 47,000 psi tensile, 37,500 psi yield, and 3.7 per cent elongation.

For More Details Circle No. 468—Page 192

PURECO CO Supply Systems



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Pureco offers a variety of both high and low pressure CO_2 supply systems—*cylinders, cylinder banks, converters, receivers*—as modern as today—each "tailored" to fit your particular requirements. Pureco will supervise the installation, maintain and insure the function of the equipment—also assure a dependable supply of CO_2 from over 100 conveniently located distribution points. Call your Pureco representative today!

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Circle 710 on Page 51

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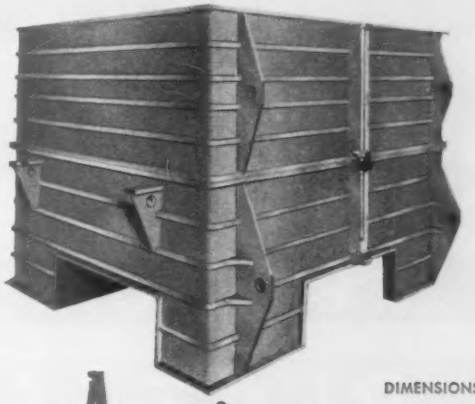

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Specially designed for a large eastern foundry, this heavy duty flask is one example of the close cooperation between our experienced engineering department and our customer-foundry.

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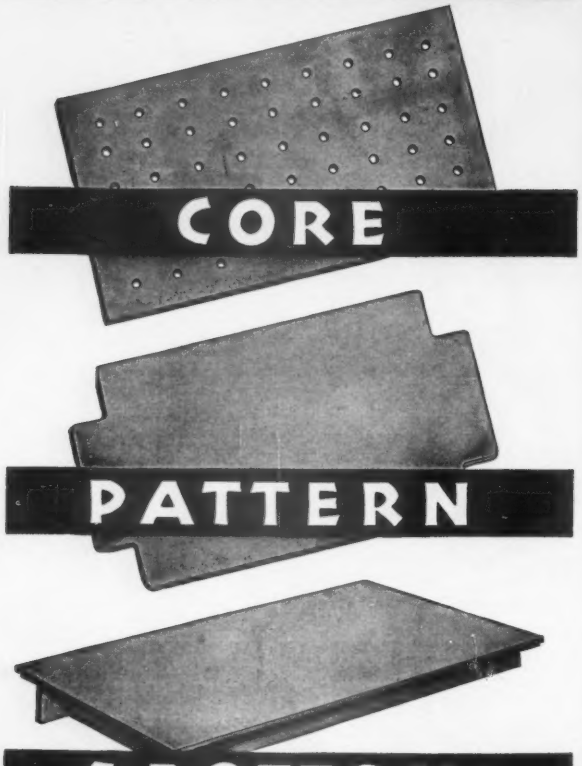
Circle 711 on Page 51

MOLTRUP



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for accurate casting results specify Moltrup Plates! They *stay flat* and *last longer* than other types—for Moltrup employs a special flattening process designed to permanently eliminate buckling or bending.

Consequently your investment goes further and that *all-important profit-margin* increases. Plates are made to your specifications—we welcome the opportunity to furnish complete information.

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BULLARD'S SAVE-T FOUNDRY WHEEL

Designed For Foundry Men and Machines

Featuring—Formula 6A

Better Quality?	**Yes** √	**No**____
Freer Cutting?	**Yes** √	**No**____
Longer Wearing	**Yes** √	**No**____
Reduced Hazards?	**Yes** √	**No**____
Fast Deliveries?	**Yes** √	**No**____
Premium Prices?	**Yes**____	**No** √

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Circle 713 on Page 51

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MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

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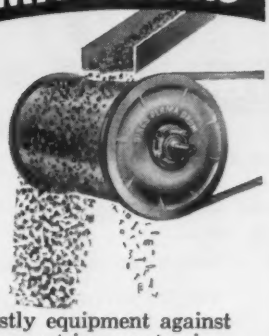
Circle 712 on Page 51

Circle 714 on Page 51

Where no other type of Magnetic Separator is practical . . .

use

DINGS PERMA-DRUMS



- in machines
- under chutes or spouts
- below apron conveyors
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Now you can protect costly equipment against tramp iron damage . . . prevent iron contamination of materials and products . . . in spots where no other type of magnetic separator can operate efficiently.

Why take a chance on tramp iron damage? Investigate the money-saving potential of Dings powerful, automatic, life-time guaranteed Perma-Drums.

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Dings DINGS MAGNETIC SEPARATOR COMPANY

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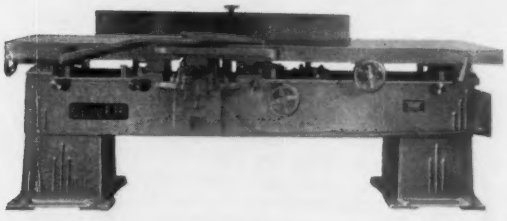
Circle 715 on Page 51

Save time! Cut perfect glue joints...plane draft on pattern lumber with this OLIVER



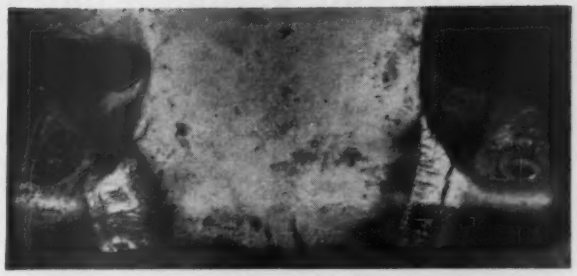
Here's just one reason why this Oliver is the patternmaker's favorite: The front table tilts sideways up to 5° to plane draft on lumber. This Oliver Jointer easily planes short and long pieces of stock. Tables adjustable for ¾" cut. Fence adjustable from square to 45° across table. New rabbeting attachment. Sturdy cabinet columns eliminate vibration. Three sizes: 20, 24, 30 inches wide. Write for Bulletin No. 12.

Oliver makes heavy Jointers in 12" and 16" sizes; heavy-type Jointers in 6" and 8" sizes.

OLIVER SINCE 1890

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 716 on Page 51



Cracked cast iron motor casing welded with

Ni-Rod "55" ..$8,000 saved!

When supports of a digester drive motor cracked, production in a Canadian paper mill halted.

A new casting and lost production would cost over $8000!

How about repairing the cast iron supports? Welding Engineers Limited, of Montreal, said it could be done—with Ni-Rod* "55"* electrodes. The company used only 40 pounds of Ni-Rod "55" electrode to do the job. And the digester was back in operation the next morning. Total cost of the repair: $325.

Emergency repairs—and production welding, too—are fast and simple with Ni-Rod "55" electrode. No special equipment. No new training for weldors. Arc is stable and slag removal easy. Most jobs require no preheat.

Repair Cast Iron Parts Quickly and Easily gives illustrated examples of the many jobs you can do with Ni-Rod "55" electrode. For your copy, just write.

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Electrodes · Wires · Fluxes

Circle 717 on Page 51

send for this valuable quick-reference 17" x 22" standard alloy wall chart FREE

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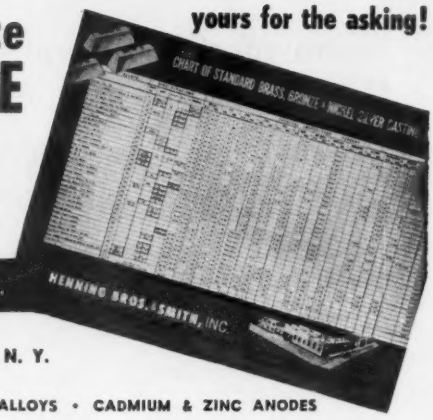

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Circle 718 on Page 51

Complete REPAIR SERVICE on all makes METALLOGRAPHS, MICROSCOPES

New Leitz Xenon Illuminator 45000 c.p. per sq. cm. adaptable to most units.

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Circle 719 on Page 51

HIGH SILICA QUARTZITE PEBBLES

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R. W. SIDLEY, INC.

THOMPSON, OHIO TEL. 2701

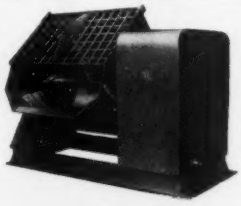
Circle 720 on Page 51

$395
No. 2 Lab. Model
Capacity 100 lbs.

SUPERMIX BETTER CORES AT LOWER COST

CUTS MIXING TIME 50% • MINIMIZES AIR HARDENING
NO HEATING • NO CRUSHING • NO BALLING • EASILY CLEANED
FOR MIXING • CORE SAND • FACINGS • REFRACTORIES
CALL OR WRITE TODAY FOR COMPLETE DETAILS.

UNITED STATES FORGE AND FOUNDRY CO. PULASKI, N.Y.



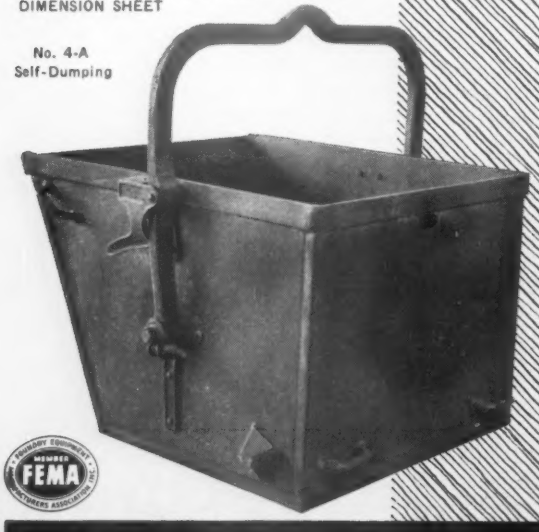
Circle 721 on Page 51

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

No. 4-A
Self-Dumping



FEMA MEMBER

PENN IRON WORKS, INC.
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Circle 722 on Page 51

SPRAYING SYSTEMS
SPRAY NOZZLES
better in every way

DESIGN—based on advanced research and engineering.
CAPACITIES—the most complete nozzle selection in the field.
TYPES—full cone, hollow cone, flat spray, square spray, straight stream and pneumatic atomizing.
MATERIALS—brass, stainless steel or any other required material.
IDENTIFICATION—all nozzles clearly stamped for easy identification and re-ordering.
PROMPT SERVICE—inventory of over 12,000 TYPES maintained for prompt delivery.

Whatever your need, you will find Spraying Systems products and service of real advantage.

Write for Catalog 24

SPRAYING SYSTEMS CO.
3236 Randolph Street • Bellwood, Illinois

ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

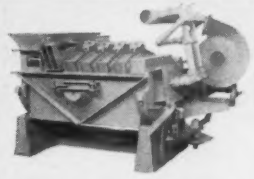
Circle 723 on Page 51

For Finer, Faster Castings

STROMAN FURNACES

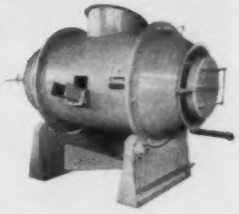
Melting Brass, Bronze, Aluminum, Magnesium or any other non-ferrous metal? Are you Sand Casting, Die Casting, Billet Casting, Permanent Molding, Extruding or Forging? If so, Stroman is your natural source for melting furnaces . . . for Stroman builds only the finest, fastest melting, most economical, longest lasting and of course the most modern furnaces to melt any metal.

Illustrated are just a few of the various models available. A letter will bring Bulletin No. 150 which illustrates the complete line . . . or better yet let a Stroman Metallurgist consult with you on their application in your plant.

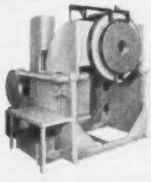


STROMAN "JC" TILTING TYPE FURNACES FOR MELTING BRASS. Fastest Melting . . . from 15 minutes up . . . lowest fuel consumption . . . always perfect metal for castings . . . capacities from 400 pounds to largest requirements.

STROMAN REVERBERATORIES for the melting of Unlimited Capacities of Aluminum, Zinc or Brass. Excellent for Smelters or Billet Casters.



STROMAN "RF" BARREL TYPE POWER TILT FURNACE for Brass, Aluminum, Iron and various smelting operations. Sizes range up to 20,000 pounds brass.



STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACES . . . MECHANICALLY OR HYDRAULICALLY TILTED. For brass, bronze, aluminum and other non-ferrous metals. Made in sizes from No. 60 to No. 1000 crucible.

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STROMAN MANUAL TILT CRUCIBLE MELTING FURNACE. The old standby for melting Brass, Bronze, Aluminum and other alloys with capacities from No. 30 to No. 600 crucible. Real lasting construction and new gear box makes tilting so easy.

STROMAN FURNACE & ENGINEERING COMPANY
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Circle 724 on Page 51

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"THAT GOOD" FOUNDRY COKE

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Circle 725 on Page 51

Steel Safety Toe PLUS Air Cushion Insole give Full Safety PLUS Extra Comfort in the BRONSON MOLDER'S SHOE.

An unbeatable combination of Safety, Comfort and Durability is provided in the BRONSON Molder's Shoe. The Molder's Shoe design plus leather lined steel toe box give maximum safety. Air-cushion Insole and built-in longitudinal and metatarsal supports give extra comfort. Black Elk uppers and Neoprene soles and heels with full leather middle sole give maximum wear. Write TODAY for details and prices.

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Circle 726 on Page 51

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The Most Useful Handbook Ever Written on

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MACHINE DESIGN

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Company_____
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City_____ State_____

Circle 727 on Page 51

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY SUPERINTENDENT

Excellent job in 700 ton per month steel jobbing foundry. Relocation expenses paid. All replies held in strictest confidence.

BOX 876, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Manager for gray iron foundry, West Toronto, producing mostly captive work. Applicant besides foundry experience must have estimating and sales experience for quoting outside jobs. Apply by letter, quoting experience.

EMCO LIMITED
LONDON, CANADA

SALES ENGINEER

Staff position for sales development with large metal producer. Man to work with metal distributors, foundries and consumers of castings. Experience in foundry sales, production, or related metal industry would be desirable. B. S. in Engineering or Business Administration minimum. Headquarters New York City. Age to 35. Send complete resume and minimum salary requirements.

BOX 856, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MELTING FOREMAN

Experience in cupola, and electric furnace melting, and refractories. Large productive gray iron foundry located middlewest. Good opportunity for right man.

BOX 857, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN SUPERINTENDENT

Eastern soil pipe and fitting foundry has an opening for an experienced supervisor able to produce high quality gray iron castings. Must be mechanical and a good manager. Age limit 35 to 55. Address: Box 860, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRY MANAGER

Established Milwaukee Foundry wants man to direct complete job shop operations. Must have successful sales background. Salary open. Send work history to: Box 852, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ASSOCIATE ENGINEERS

A long established nationally known firm of Foundry Engineers wants Associate Engineers who are thoroughly experienced in the Foundry Industry—Work Measurement—Costs—Systems—Layout. Address: Box 867, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Medium size sand aluminum foundry near Cleveland, specializing in medium and large jobbing work. Must know all phases of foundry operations and aluminum alloys. In reply, give age, experience, references and include a photograph. Address: Box 828, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY METALLURGISTS

Opportunity is knocking for a gray iron foundry metallurgist under 40 who:

1. Would like complete charge of metallurgy, sand control, and foundry engineering with a medium sized gray iron jobbing foundry beautifully situated in New England.
2. Wants to grow with two young men in developing a well established business into an outstanding foundry.

This is a rare opportunity for a well trained man to fit into a situation that is challenging, stimulating and rewarding.

BOX 882, FOUNDRY
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Positions Wanted

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Young Engineer, age 31. MIT Grad ME plus Business Administration, 8 years diversified technical and management experience. Strong on modern production techniques and precision foundry processes. Recent extensive foreign experience on contract to large British manufacturing organization. Familiar overseas specialized requirements—Marketing, Procurement, Labor, General Administration, etc. Now have temporary position managing small foundry Midwest. Available early Spring. Seeking challenging opportunity where foreign background will be an asset. Prefer company planning or operating overseas manufacturing facilities. Present income $12,000. Address: Box 870, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER

Experienced in foundry operations for 35 years. Proven ability for cost savings. M.S. degree in Metallurgy. Exceptional references. Address: Box 877, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES ENGINEER

Foundryman with broad experience in automotive and agricultural castings, with technical, operating, sales engineering and management background, want sales engineering position, foundry or allied foundry products. Prefer Michigan area, but will consider other. Salary open. Address: Box 849, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Metallurgical background, cost and quality minded, well versed in all phases of gray iron production foundry operations, including cupola, sand and newest developments, presently with farm equipment manufacturers. Desire a permanent association with a modern organization. Address: Box 874, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGEMENT

Experienced production supervisor in automotive foundry including pouring and finishing operations. Chief inspector in ferrous and nonferrous foundry. Three years' experience in shell molding. Graduate industrial engineer. Address: Box 869, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Experienced in all foundry departments, brass, bronze and aluminum, in all die casting departments and finishing, 24 years' experience. Age 45. Address: Box 859, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SALES OR SUPERINTENDENT POSITION

Forty-six year old foundryman, 16 years' experience, 9 years in sales and service, supervisory experience on latest type automatic molding machines and all phases of foundry operation. Know cupola, air furnace, sand control and rigging. Can set up statistical quality control program. Will consider sales or superintendent position. Address: Box 875, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL MANAGER

Desire position with gray iron or nonferrous foundry. Past experience—top management of gray iron mechanized plant employing over 300 and melting 60 to 110 tons daily. Background includes production of jobbing-soil pipe-screwed fittings. Highly cost conscious and excellent labor relations at all levels. Address: Box 878, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Eighteen years' experience. Good knowledge of all phases of high production ferrous foundry operations. Practical experience in rigging, pattern design, quality problems, operating and management. Employed. Will relocate anywhere. Address: Box 871, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

German, living in Canada, age 47; thorough knowledge of all phases of gray iron foundry operations, including cupola; 32 years' gray iron foundry experience, 13 years foundry supervision. References furnished. Address: Box 854, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER

Thirty-two years' experience covering gray cast iron, malleable cast iron, pearlitic malleable cast iron and cast steel. Experience in automotive, agricultural, stove plate and enamelware castings. Work background, manager, foundry consultant, sales engineer, operating foreman and metallurgist. Aggressive. Salary open. Address: Box 833, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

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GRAY IRON OR SEMI-STEEL FOUNDRYMAN

Wish a position either as manager, superintendent or salesman. Experience of 35 years as molder, coremaker, assistant superintendent, salesman and foundry owner. On heavy machinery, automotive dies and production castings. Address: Box 858, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Capable of taking full charge of foundry operations. Have 20 years' experience with pattern, precision and prototype castings. Worked with the casting of aluminum, white metals, magnesium, brass and bronze by the plaster process. Address: Box 873, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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FOUNDRY MANAGER OR SUPERINTENDENT

Age 45, practical experience, ferrous, nonferrous metals. Now producing large castings with latest and most efficient methods, including CO_2. Excellent administrative ability. Good labor relations. Address: Box 862, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Twenty-five years' experience in all phases of cleaning room work, cast iron or steel, use of powder wash, torches also arc-air. Address: Box 880, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact
DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Positions Wanted

SUPERINTENDENT OR MANAGER
Young Metallurgical Engineer well experienced in supervision and all gray iron operations. Interested in responsible position with opportunity. Address: Box 861, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT
Well-known ferrous—nonferrous foundryman and consulting authority on foundry practice desires a good permanent association with a progressive firm. Address: Box 843, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT
Practical and technical, 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 879, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Thorough knowledge of all practical phases of steel and iron foundry operations, jobbing and production. Engineering graduate, cost and quality minded, excellent personnel relations. Address: Box 864, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 868, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD DESIGNER
Wish part time work, design, layout, detail estimating. Address: Box 840, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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CHARLIE AMMEN'S FOUNDERS CORRESPONDENCE SCHOOL OFFERS
A simple complete course in founding stressing the small details, practices and variables involved in the basic operations necessary to the production of quality castings. Address: Box 842, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Reduce cost, increase quality and quantity, reduce scrap, by a simple effective service performed in your plant. For details address: CHARLIE AMMEN, 1029 PHILIP ST., NEW ORLEANS, LA.

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BOX 850, FOUNDRY
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SALES REPRESENTATIVES
National foundry equipment and supply company offers profitable association for experienced salesmen. Liberal commission on exclusive territory basis. Prefer men with knowledge of melting furnaces. Certain other lines in foundry equipment and supplies also open. Submit resume immediately to: Box 863, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Jobbers and dealers of foundry equipment to handle new "Plastic Core Box Vent". For particulars Address: BETTER FOUNDRY PRODUCTS, 10901 VERNON AVE., CHICAGO 28, ILLINOIS.

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Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.
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FEBRUARY SPECIALS
REBUILT MOTORS

HP	Make	Type	Speed
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150	G.E.—T.E.F.C. B.B.—XP	K-6328	3600
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FOR SALE

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15" x 20" AMERICAN Wheelabrator
27" x 36" AMERICAN Wheelabrator w/loader
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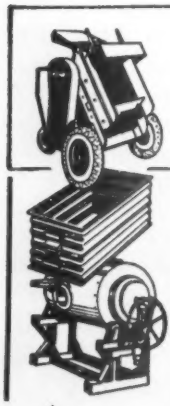

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1—#2 Simpson, 14 cu. ft. cap.

SWING GRINDERS
1—7½ H. P. Mummert-Dixon
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:
1—80 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

For Sale | For Sale

FOR SALE

1—Hydroblast Unit, Type K. Equipped with Worthington 1½ x 4" V.T.E. Pump and #5BF Ajax Shaler Shaker including #129 Hydro Blast Gun, Nozzles and Lights.

MIDWEST FOUNDRY COMPANY
P.O. BOX 127
COLDWATER, MICHIGAN

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

$10,000 stock of new Pangborn replacement parts for 6 & 9 LG-14 Table Blast priced 25% less list. Send us list of parts wanted.

9' LG-14 Pangborn Table	$4500.00
6' LG-14 Pangborn Table, like new	3000.00
6' LE Pangborn Air Table	800.00
Pangborn 53 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tumblast	5000.00
42 x 48 Wheelabrator Tumblast	1500.00
36 x 42 Wheelabrator Tumblast	2000.00
27 x 36 Wheelabrator Tumblast	2750.00
15" Continuous Wheelabrator Tumblast	1000.00
8' Wheelabrator Table Blast	2000.00
6' Wheelabrator Table Blast	3000.00
4' Wheelabrator Table Blast	2500.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-36750

We will Buy one piece or your entire plant; or represent you at any auction at a savings to you.

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt

WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

FOR SALE—PIG MACHINE

Conveyor type motorized pig machine. Pour 25-40# steel pigs. Details on request.

CRUCIBLE STEEL CASTING COMPANY
2850 SOUTH 20TH STREET
MILWAUKEE 15, WISCONSIN

FOR SALE

2 Used Model "L" Beardsley & Piper Screenarators both in very good condition. 3 phase, 60 cycle, 220 volt, motors. One is six years old, price $500.00. One is one year old, price $1500.00. Prices f.o.b. Little Falls, New Jersey. Address: NORTH JERSEY FOUNDRY CO. INC., 453 MAIN STREET, LITTLE FALLS, NEW JERSEY.

CHARLIE AMMEN'S NONFERROUS RECIPES
A collection of Patinas, washes, binders, sand, core, metal mixes and assorted dope. $7.00. Address: C. W. AMMEN, 1029 PHILIP ST., NEW ORLEANS, LA.

FOR SALE

Approximately 2,200 lbs. Falls 5% Titanium Aluminum Alloy. Address: BRISK FOUNDRY & MACHINE CO., IMLAY CITY, MICHIGAN, PHONE: RANDOLPH 4-2915.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

1—T744-5 Duplicator, No. 9 J Gorton with 744-1 Extra area and 736-1 Tracer Head . . . Never Used . . . still in original factory crates.
1—Bokoe Universal High Speed Milling and Boring Machine . . . Model F-2, with some additional equipment . . . Excellent condition . . . used only 6 months.
1—Bartlett & Snow Heavy Duty Car-Type Conveyor. Complete with cars, linkage and reducers . . . Used, fair condition and serviceable.

For further details contact:

MORRIS BEAN & COMPANY
YELLOW SPRINGS, OHIO

FOR SALE

WORTHINGTON AIR COMPRESSOR—6 x 7; 15 HP; Ser. #L 51311 . . . . . $1,250.00
GARDNER HORIZ. DISC GRINDER—54"; 20 HP 650.00
#30 & #40 Beardsley & Piper Speedmuller
Rotocione Dust Collector—#10 Type W
MOLDING MACHINES, CORE BLOWERS, FURNACES, CORE OVENS, etc.

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLenville 1-2474

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

1—3 ton Heroult Electric Arc Furnace, less transformer and panel board. Condition excellent. Will sell cheap.
2—Tea Pot Spout receiving and pouring ladles, air cooled trunnion, worm gear, 6920 capacity for steel, never used.
Several large size Hines aluminum flasks, all in excellent condition.

MEMPHIS CASTING WORKS, INC
1006 OAKLAND AVENUE
MEMPHIS 1, TENNESSEE

FOR SALE

1—GE Centrifugal Cupola Blower, 6200 CFM complete with 58 HP motor and control	$325.00
1—24" Single Wheel Fox Snag Grinder with motor	350.00
1—Self-contained 30" wide May-Fran Steel Conveyor, 40 feet long with 3 HP Drive	1500.00

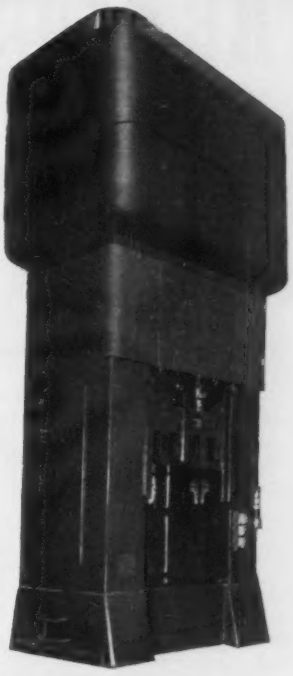
DOSTAL FOUNDRY AND MACHINE CO.
2500 WILLIAMS DRIVE
PONTIAC, MICHIGAN

#3 WHEELABRATOR TABLEBLAST
Ser. #A-38644, Model #3WA

Cabinet Height	6'
Table Height	3'3"
Work Clearance	22"
Overall Height	19'22"
Diameter	19'3¼"
Two 215 HP Motors	1750 RPM

Shotwheel motors good condition.

BOX 872, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO



Hydraulic Presses For Sale

Baldwin Southwark hydraulic press.

600 ton Elmes cast steel high speed downward working, hydraulic press, new 1943.

500 ton Baldwin Southwark high speed hydraulic press vertical downward working type.

250 ton Williams White & Co., 4 post upward working hydraulic press.

150 ton HPM "Hydro-Power" fastraverse platen hydraulic press, new 1946.

100 ton HPM "Hydro-Power" hydraulic press, 4 post, platen type, self contained.

Write for catalogue of complete listings

MILES MACHINERY COMPANY

2047 East Genesee Street
Saginaw, Michigan
Phone PL 2-3105

Circle 872 on Page 51

THE ACME BARGAIN PAGE

AIR COMPRESSORS
2—INGERSOLL RAND 450 cfm., 100 hp., 220-440 V.
1—CHICAGO PNEUMATIC 225 cfm., 50 hp., 220-440 V.

BELTING
30" x 280' 24" x 263'
29" x 180' 24" x 152'
24" x 120'

BLOWERS
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
WHITING-ALLIS CHALMERS 5750 cfm., 28 oz., 60 hp., 440 V.
WHITING-SPENCER 5600 cfm., 32 oz., 75 hp., 220-440 V.
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.

CONVERTERS—MOTOR GENERATORS
1—100KW WESTINGHOUSE 250 V. DC. 400 AMP. 220 V. Crocker Wheeler controller and panel.
1—15KW HERTNER Motor Generator Set, 25 hp., 3/60/220-440 V. primary, 250 V. 60 amp DC.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK BELT Oscillating pan.
17' BARBER GREEN Bucket Conveyor.
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives.

CORE BLOWERS
CHAMPION CB400 up to 300# cores. 6½" draw.
2—CB15 up to 55# cores, Universal blow plate
C.B. 10 up to 12# cores, 4½" draw.
DEMMLER #4 up to 250# cores.
DEMMLER #3 up to 35# cores.
DEMMLER #2 up to 20# cores.
INTERNATIONAL SB15H, up to 150# cores, Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores
REDFORD Bench types, horizontal or vertical clamping

CORE DRAW
SPO CD 36 14" x 41" rollout table.

CORE GRINDER
MILWAUKEE 70-12, 70" dia. table
6—MILWAUKEE 70-9, 70" dia. table
1—OWOSSO DE1-303 42" table

CORE OVENS INDUCTION
THERMONIC 1800A cap 2000# hour

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE PASTE OVENS
COLEMAN 28' Horizontal

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 5 TON Electric Traveling DC motors 50' span
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 Ton AMERICAN Railmaster Low headroom floor control
10 Ton SHAW BOX electric hoist

CRUSHER—PULVERIZER
STEDMAN 12" x 12" 4/10 hp 3/60/220-440 V motor

CUPOLA GUNS
2—BONDACTOR #1250
BONDACTOR #1000

DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

FEEDERS
3—SYNTRON Vibra Flow Feeders F4100, w/controllers

FLASK SECTIONS STEEL
42—27½" x 48" x 8½" high
26—39½" x 53½" x 9" high

FURNACES NONFERROUS
STROMAN 1000# Oil fired, hydraulic tilt.
CAMPBELL HAUSFELD Staty, pot type
FISHER RB100 gas fired crucible

GRINDERS, SNAG
2—HAMMOND 20" DE 10WR1 10 hp., 220-440 V.
1—HAMMOND 20" DE Porter Cable backstands 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
1—US #65 D. End 30" x 3" x 12" 20 hp., 4 speed, 440 V.

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
U.S. 20" x 2½" x 6" 10 hp., 220-440 V.

GRINDERS, MISC.
PORTER CABLE BG8 Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel
HAMMOND WR-2, 2 speed 30" x 3" Wheel

HOISTS
YALE 5 TON floor control power travel
SHAW BOX 5 TON floor control Hand travel
4—INGERSOLL-RAND Air trolleys
3—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Geared Crane
1—5000# Modern Enclosed Geared Crane
3—2125# Industrial Enclosed Geared Crane
1—2000# Whiting Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

LADLE HEATERS
2—NORTH AMERICAN Flexible hose.

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES
JOLT SQUEEZE PIN LIFT
2—MILWAUKEE 125-3-21" x 27" Table 8" draw.
7—OSBORN 712 PJ, 18" x 21" Table
1—CHAMPION JSL10P 18" x 21" table 6" draw.

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
1—SPO, 110J Portable 17" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

JOLT ROLLOVER DRAWS
4000# HERMAN, 36" x 60" table
3000# HERMAN, 52" x 84" table
1500# HERMAN, 26" x 48" table
3—1000# TABOR, 30" x 51" table, portable
3—#22 DAVENPORT
1020 JOHNSTON & JENNINGS, 60" x 50" table
2—750# HERMAN 20" x 30" table
20 x 8" INTERNATIONAL type G, 20" x 30" table
2—INTERNATIONAL RJ 20 x 12"
2—INTERNATIONAL RJ 14 x 8"

JOLT PIN LIFTS
3—INTERNATIONAL 1200-3 26" x 27" table 3" draw
1—INTERNATIONAL 26" x 30" table, 8" draw

JOLT SQUEEZE FRAME STRIP
#814 OSBORN 14" x 30" Pattern space.
2—331 OSBORN

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
1—#2 SIMPSON Unit Drive
2—#1 SIMPSON Mullers
1—24" SIMPSON Laboratory muller
1—WONDER "HOE BOY" 3-4 cu. ft.

POLISHING MACHINES
MARSCHKE 6 Station Roto-Mat 5-heads.

RIDDLES
2—B&P CHAMPION 200# per min.
1—UNIVERSAL 20"

SAND CUTTERS
1—SCREENARATOR MODEL "S"
1—ROYER MCZ-43

SAND SLINGERS
2—B&P Tractor 19" heads
B&P 2 speed 40/25 HP double belt
B&P Plate Feeder, 5 ton

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
32" CRESCENT, 2 hp., 440 V.
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.
6" x 6" RACINE Oil Cut Hack Saw

SAWS, CUTOFF
DEWALT ME-1 16" Blade 5 hp.
DEWALT ME-3 Abrasive cutoff 18" wheel
DEWALT GP 14" wheel 3 hp. 220-440 V.
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SCREENS
3' x 8' SIMPLICITY

SHAKEOUTS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
5' x 10' LINK BELT

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
TINIUS OLSON Hardness Tester
COLEMAN 55 Spectrophotometer
BALDWIN SOUTHWARK 20,000 Tensile Tester w/load indicator and recorder

TUMBLING BARRELS
3—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.
SLY 42" x 42" x 56" 5 hp.
SLY 36" x 72" 7½ hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loader
1—27" x 36" AMERICAN Skip Loader
1—20" x 27" AMERICAN Rubber Belt

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc.
OLIVER 72DR Router or borer
PORTER 24" Facing Planer
BOICE CRANE 12" Planer
SYRACUSE 15" Disc Sander
STATE Oscillating Spindle Sander
HESTON ANDERSON Swing Saw #5
DELTA 10" UNISAW
OLIVER Patternmakers Vises
NORTHFIELD #4 Tilting Arbor Saw
OLIVER 20A Pattern Lathe 16"
PUTNAM Pattern Lathe 24" x 12'

WIRE STRAIGHTENERS
AMERICAN type H rod ⅜"-⅝" cap.
#2A CLIMAX
#2 CLIMAX

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire plant

126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—SULLIVAN angle compound, 600 CFM.

AIR & ELECTRIC HOISTS

15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, D-6, ¼, ½, 1 and 3 ton capacity.
4—KELLER 1 ton capacity air hoists.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
1—DeWALT ME 2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
TABOR C10AF—18" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SPO Model SC-10-DM Shell Core Blower.
1—SAN-BLOW, Model CB-40-B, 40# Cores.

CORE OVENS

4—CARL MAYER 2-Compartment, oil fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
1—ROOTS CONNERSVILLE Type RCS Size 20 x 60 w/75 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1250-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit, 9600 cycles.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.
1—DETROIT Size CM—8000# Cold Charge w/1000 KVA transformer.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilting. Sizes 150, 400, 600, 1700, 2000 & 2400#, aluminum capacities. Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225.
29—LINDBERG FISHER & CAMPBELL, HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Iron.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type.
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles, 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MUST BE SOLD

INDIVIDUAL ITEMS OR BULK
WHITING No. 9 Cupola
With Swivel type Charger Skip
Hoist type w/storage hoppers
Scales & Cone Bottom "Wish Bone" Buckets, Mixing Ladle & Blower.

MOLDING MACHINES

Jolt Squeezers

37-OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt

1—HERMAN 40" x 58" table, 3000# cap.
1—HERMAN 8' x 12' table, 32,000# cap.
1—J&J 50 x 72 Table—5000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30.
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Sizes 20" x 8", 24" x 10".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs. Cap.
2—OSBORN 643—Table 35 x 50—2000# cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table, 10" Draw.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE No. 216, 22" x 42" table. 21" dia. sq. cyl.
1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".
1—OSBORN 716 PV—22" x 34" Table—16" dia. sq cyl.
1—SPO #2134, 19" x 27" Table.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80'.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.

Roller

2500' MATHEWS 6", 12", 18" & 20" wide. 2⅛" dia. roller, 1¼" hex shaft centers, 4" channel.
500—MATHEWS 12" & 36" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.
3—NEWAYGO HS-7-GT Twin Hopper Handy Sandy's.

SAND MULLERS

1—B & P #50, Speed Muller, 9 cu. ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
1—DRAVO-DOYLE 6 cu. ft. cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH
1—SIMPSON #0, Style B, 175 lb.
1—SIMPSON #2, Style C, 1500 lb.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
1—SIMPSON No. 1H Style UD—500# batch.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45° & 60° Cutting Blade.
1—ROYER S-522-9M Scrap Control 60 ton per hour capacity.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.
1—MOULDERS' FRIEND 60" Brush.
1—REDDY-SANDY Model RS-VM.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
2—B & P 16' Dia. Turntables Indexing

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 30" wide x 60" long.
2—ROBBINS 3' x 4' JF6—2000#
2—ROBBINS 3' x 5' JF6—2000#
1—ROBBINS 4' x 6' JF9—8000#
1—ROBBINS 4' x 8' JF9—10,000#
1—ROBBINS 6' x 10' JF11—20,000#
1—ROBBINS 8' x 10' JF11—30,000#
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/skip Hoist.
1—AMERICAN 27" x 36" with skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
1—AMERICAN No. 2A multi-tablast.
1—AMERICAN 20" x 27" Rubber Belt Tumblast.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53 type EN-2 blast cabinet with dust collector.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN #44NF Shot Blast Room 10' x 9' x 9'.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

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1—AMERICAN 27" x 35" WHEELABRATOR TUMBLAST
1—AMERICAN 36" x 42" WHEELABRATOR TUMBLAST
1—AMERICAN 42" x 48" WHEELABRATOR TUMBLAST, w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN 36", Continuous WHEELABRATOR, side discharge, two head, Serial #A95643, New 1953. Used 2 months
1—PANGBORN 6' TABLE-ROOM, Type LK,
1—PANGBORN TABLAST, 8' Table
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
10—WHITING 36" x 36" x 72" w/gear head motors & brakes

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1—HEWITT ROBINS Vibrating, 18" x 10'
1—JEFFREY, 3 compartment, ingot mold
1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
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10—DEMMLER #1, #2, #2A, #2K, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10.
1—RANDALL, MODEL "A", Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS
1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
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1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
2—WHITING #6 w/Skip Chargers, Blowers, and Foxboro Controls

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1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
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1—350# DETROIT LFA
1—500# DETROIT, LFN, Hydraulic
1—750# DETROIT LFY, Conical Shell
1—1500# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

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1—REDA 550#.
1—STROMAN, Gas Tilting, 1000# cap. Alum., auto control hyd. lift

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1—5 HP CINCINNATI, 2/60/110
1—5 HP GARDNER, 12" x 2½" wheels
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1—7½ HP U. S. 3/60/220, 20" wheels
1—7½ HP U. S. Model 66, 14" x 3" wheels
1—10 HP U. S. Model 65, 20" x 3" wheels
3—10 or 15 HP SWING FRAME, 22" wheels.

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Jolt Rollover Pattern Draw
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2—J & J #918, 44 x 54 Table, 20" draw
1—J & J #815, 30" x 40", 15" draw, 1200# jolt
2—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 50" x 72"
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750# 30" x 36"
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 50", 18" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
2—TABOR, 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000#
2—TABOR, 14" x 16" Rockover.

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5—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#
1—OSBORN #102
1—SPO #58P, 18" x 28" table, 800#

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1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
3—SPO #305, #307, 750 lb., 1500 lb.
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600#

Jolt Squeeze Pin Lift
2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#
2—MILWAUKEE #163, 15" x 24" table, 11" sq.
5—OSBORN, #712J, #712PJ, 18" x 28" table, 12" sq.
5—SPO #2114P, 21" x 27" table, 600#
1—SPO #2136G, 21" x 30" table, 800#

Jolt Squeezers
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL #12 LJS, 17" x 20" table, stationary and portable
1—MILWAUKEE #104-5JS, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
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1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb., capacity, Solid Tire

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1—B&P #70 Speedmullor, 6'5" Dia., 15 cu. ft. batch
1—B&P #40 Speedmullor, 5 cu. ft. batch
1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
1—CLEARFIELD #404, 4' Dia., 4 cu. ft. batch
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.
1—MULLER Plaster & Mortar Mixer, 3 cu. ft. batch, Pneumatic Tires
5—SIMPSON #0, 3' Diameter, 175 lbs.
1—SIMPSON #1½ Style UD, 4'6" Dia., 6 cu. ft. batch
1—SIMPSON #2, 6' Dia., 14 cu. ft. batch
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch

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1—MODERN Crane Type, 54" H x 39" top dia.
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1—MODERN Crane Type, 60" H x 50" top dia.

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8—WHITING, 26" L x 25" dia., 1100# iron
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1—WHITING, Size 45" x 56"

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7—WHITING, 850# to 2000# gross cap.

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1—COLEMAN Gas, 2 Comp. and 5 drawers, OD. 22" x 12' x 10'
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2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

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2—B & P Screenarator, Model "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
2—ROYER, NDP 15-25 tons/hr., 2 HP Motor
2—ROYER, NC-2, 10-15 tons/hr., 1½ HP Motor

SAND CUTTERS
1—AMERICAN, 15 HP, 96/78 Reel

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3—HEWITT ROBINS, Vibrex Screen, 3' x 8', 5' x 8', 8' x 10' dual
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1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
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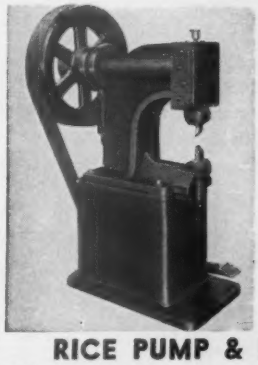

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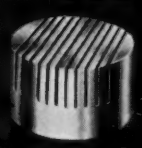

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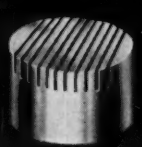

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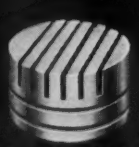

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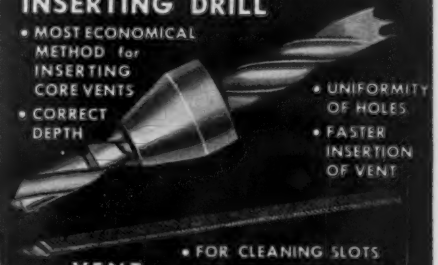

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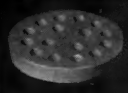

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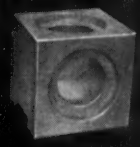

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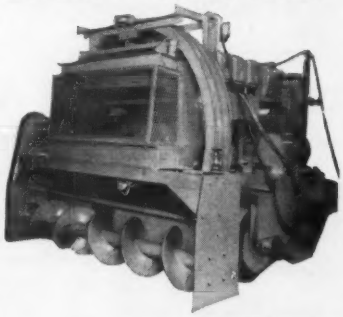

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MECHANIZATION

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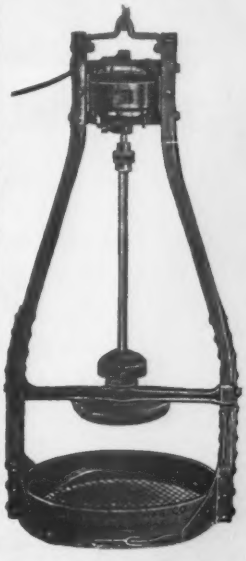

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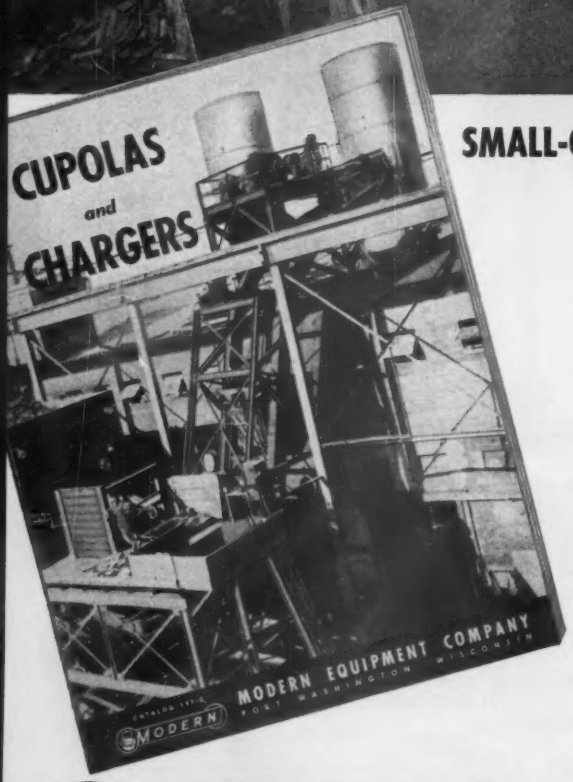

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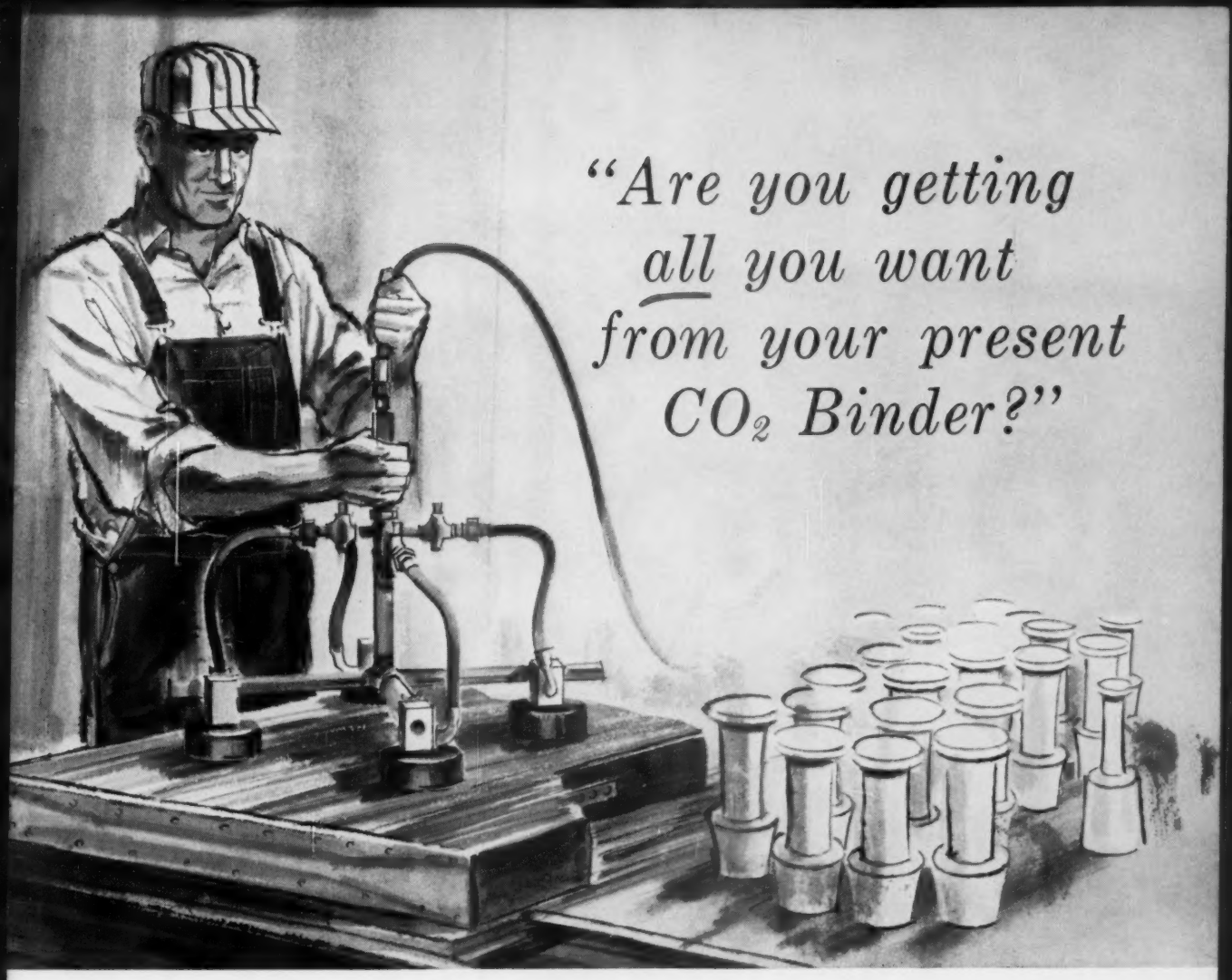

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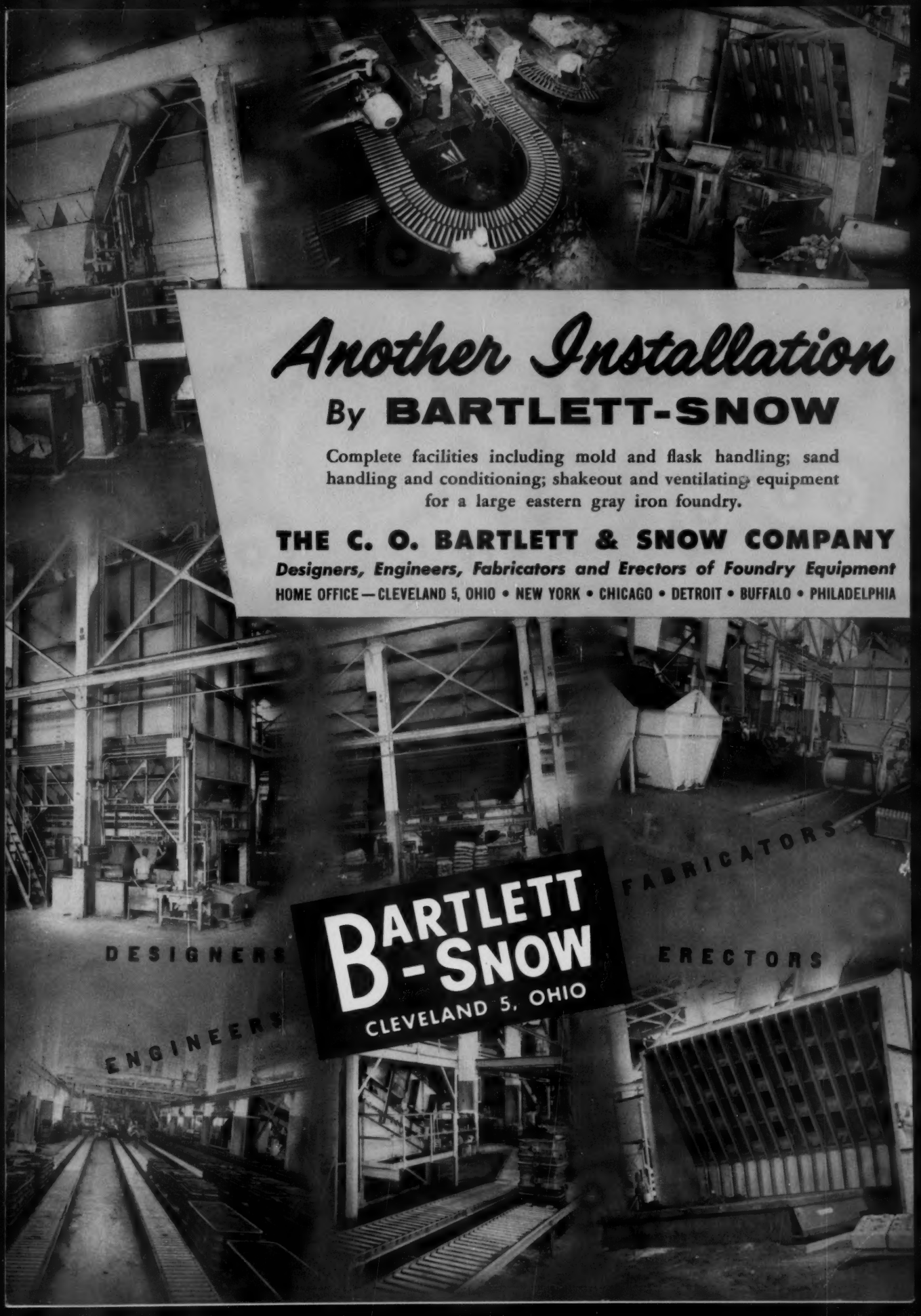

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